GABD-000240
Ed. 03

OfficeServ 7400

System Description

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INTRODUCTION

Purpose

This document introduces product overview, Hardware configuration, Specification and functions of OfficeServ 7400, which are required to understand the OfficeServ 7400 system.

Document Content and Organization

This document consists of 4 chapters and abbreviations.

CHAPTER 1. Overview of OfficeServ 7400

Describes the features and the main functions of OfficeServ 7400 over all and introduces system configuration, interface and programming.

CHAPTER 2. Hardware of OfficeServ 7400

Describes Hardware features, Chassis composition, modules by functions and configuration of OfficeServ 7400. In addition, this chapter describes various stations, wireless equipment and additional equipment available for OfficeServ 7400.

CHAPTER 3. Specification of OfficeServ 7400

Describes the detailed standards, such as system capacity, electrical standards, power standards, ring and tone, equipment specification, of OfficeServ 7400.

CHAPTER 4. Functions of OfficeServ 7400

Describes Call, VoIP, Data, Unified Messaging Service (UMS), and Web and System management functions provided by OfficeServ 7400.

ABBREVIATION

Provides solutions for the abbreviations used in this manual.

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Conventions

The following types of paragraphs contain special information that must be carefully read and thoroughly understood. Such information may or may not be enclosed in a rectangular box, separating it from the main text, but is always preceded by an icon and/or a bold title.

CHECKPOINT

Provides the operator with checkpoints for stable system operation.

NOTE

Indicates additional information as a reference.

Reference

OfficeServ 7400 Installation Manual

Describes the condition to install the OfficeServ 7400 system and how to inspect and operate the system.

Revision History

EDITION	DATE OF ISSUE	REMARKS
00	10. 2007.	First Edition
01	10. 2008.	- The MP 40 functions were changed. - Boards added: MGI16, 4HTRK, GPLIMT, GSIMT, GWIMT, 8SLI2, 8COMBO2, 8TRK2, 16TRK, PLIM2 - Delete: 4WLI, WBS 24, WIP-5000M, 4DSL - Replaced: MGI → MGI16/64, 8HYB/ 8HYB2 → 8COMBO2, 16DLI → 16DLI2
02	04. 2009	Added Turkey RoHS announcement
03	04. 2010	- Added CNF24, OAS

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TABLE OF CONTENTS

INTRODUCTION I

Purpose I
Document Content and Organization I
Conventions II
Reference II
Revision History II

CHAPTER 1. Overview of OfficeServ 7400 1-1

1.1 Introduction to System 1-1
1.1.1 Main Functions 1-1
1.1.2 System Architecture 1-3

1.2 Interface 1-6
1.2.1 Interfaces between Sub-modules 1-6
1.2.2 Interfaces between VoIP Components 1-8

1.3 Programming 1-9

CHAPTER 2. Hardware of OfficeServ 7400 2-1

2.1 Features of Hardware 2-1

2.2 Chassis Configuration 2-3
2.2.1 Configuration of Slots 2-4

2.3 Modules by Functions 2-5
2.3.1 Control Module 2-5
2.3.2 Voice Trunk Line Module 2-12
2.3.3 Voice Station Module 2-20
2.3.4 Data Server Module 2-25
2.3.5 Voice Application Module 2-37
2.3.6 SVMi-20E 2-44

2.4 Station Phones 2-46
2.4.1 Regular Phones 2-46
2.4.2 Digital Phones 2-46
2.4.3 IP Phones 2-49

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2.4.4 Add-On Module (AOM) 2-52
2.4.5 Keyset Daughter Board (KDB) 2-52
2.4.6 Door Phone and Door Phone Interface Module (DPIM) 2-53

2.5 Wireless LAN Device 2-54
2.5.1 Wireless LAN Access Point (SMT-R2000) 2-54
2.5.2 Mobile Phone 2-54

2.6 Additional Devices 2-55
2.6.1 On Hold/Background Sound Source 2-55
2.6.2 External Units 2-55
2.6.3 Loud Bell 2-55
2.6.4 Common Bell 2-55
2.6.5 OSM 2-55
2.6.6 Installation Tool 2-56
2.6.7 SMDR 2-56
2.6.8 CTI 2-56
2.6.9 NMS 2-56

CHAPTER 3. Specification of OfficeServ 7400 3-1

3.1 System Capacity 3-1
3.1.1 Trunk Line Capacity 3-3
3.1.2 Station (Subscriber) Line Capacity 3-3
3.1.3 Number of Channels 3-3

3.2 Electrical Specification 3-4
3.2.1 Signal Specification 3-4
3.2.2 Transmission Characteristics 3-12
3.2.3 Line Conditions 3-12

3.3 Power Specification 3-13
3.3.1 OfficeServ 7400 System Power 3-13
3.3.2 External Rectifier 3-13

3.4 Rings and Tones 3-14
3.4.1 Ring Cycles 3-14
3.4.2 Tones 3-14

3.5 Available Terminals 3-15

3.6 Equipment Specification 3-16

3.7 Port Number Usage Detail 3-17
3.7.1 OfficeServ 7000 Series Port Number 3-17
3.7.2 OfficeServ Solutions Port Number 3-19

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CHAPTER 4. Functions of OfficeServ 7400 4-1

4.1 Call Functions 4-1

4.1.1 Dynamic IP Address Allocation 4-1

4.1.2 Router Interconnection Function 4-2

4.1.3 Router ALG Interface 4-3

4.2 VoIP Function 4-4

4.2.1 VoIP Network 4-4

4.2.2 VoIP Trunk Line Interface 4-4

4.2.3 SIP Phone Interface 4-4

4.2.4 Call Log 4-5

4.2.5 Forward Busy 4-5

4.2.6 Forward No Answer 4-5

4.2.7 Parallel Forking 4-5

4.3 Data Server Functions 4-6

4.3.1 Switches 4-6

4.3.2 Router 4-8

4.3.3 Security 4-11

4.3.4 Data Server Applications Functions 4-12

4.5 System Management Function 4-14

4.5.1 System Management Function 4-14

4.6 NMS Management Function 4-14

ABBREVIATION I

A ~ D I

E ~ K II

L ~ Q III

R ~ V IV

W V

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LIST OF FIGURES

Figure 1.1 Configuration of OfficeServ 7400 Service 1-3
Figure 1.2 Interface between VoIP Components 1-8

Figure 2.1 Configuration of OfficeServ 7400 Chassis 2-3
Figure 2.2 Front View of MP40 2-7
Figure 2.3 Front View of LP40 2-10
Figure 2.4 Front View of TEPRI ..... **Error! Bookmark not defined.**
Figure 2.5 Front View of the TEPRIa Board 2-12
Figure 2.6 Front View of TEPRI2 2-14
Figure 2.7 Front View of 4BRI 2-16
Figure 2.8 Front View of 8TRK 2-17
Figure 2.9 Front View of the 8TRK2 Board 2-18
Figure 2.10 Front View of the 16TRK Board 2-19
Figure 2.11 Front View of 8DLI 2-20
Figure 2.12 Front View of 8COMBO ..... **Error! Bookmark not defined.**
Figure 2.13 Front View of 8COMBO2 2-21
Figure 2.14 Front View of the 8SLI Board ..... **Error! Bookmark not defined.**
Figure 2.15 Front View of the 8SLI2 Board 2-22
Figure 2.16 Front View of 16MWSLI 2-23
Figure 2.17 Front View of 16SLI2 2-23
Figure 2.18 Front View of 16DLI2 2-24
Figure 2.19 Front View of LIM 2-25
Figure 2.20 Front View of PLIM 2-27
Figure 2.21 Front View of the PLIM2 Board 2-29
Figure 2.22 Front View of GPLIM ..... **Error! Bookmark not defined.**
Figure 2.23 Front View of GPLIMT 2-30
Figure 2.24 Front View of GSIM 2-32
Figure 2.25 Front View of GSIMT 2-33
Figure 2.26 Front View of GWIM ..... **Error! Bookmark not defined.**
Figure 2.27 Front View of GWIMT 2-36
Figure 2.28 Front View of 4DSL ..... **Error! Bookmark not defined.**
Figure 2.29 Front View of MGI ..... **Error! Bookmark not defined.**
Figure 2.30 Front View of MGI64 2-37
Figure 2.31 Front View of MGI16 2-38
Figure 2.32 Main Module of SVMi-20E 2-44
Figure 2.33 DPLIM and Door Phone 2-53
Figure 2.34 SMT-R2000 2-54
Figure 2.35 SMT-W5100 2-54

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Figure 3.1 Trunk Line Loop Start Signaling 3-4
Figure 3.2 External Rectifier 3-13
Figure 3.3 Chassis Configuration of OfficeServ 7400 3-16

LIST OF TABLES

Table 1.1 Interface between Sub Modules 1-6

Table 2.1 Configuration in the Back side of OfficeServ 7400 2-4
Table 2.2 Modules that can be mounted on the slots 2-4
Table 2.3 Modules by Functions 2-5
Table 2.4 Specification of MP40 2-6
Table 2.5 Ports of MP40 2-7
Table 2.6 Specification of LP40 2-10
Table 2.7 Ports and LEDs of LP40 2-11
Table 2.8 Ports and LEDs of TEPRI ..... **Error! Bookmark not defined.**
Table 2.9 Ports and LEDs of the TEPRIa Board 2-13
Table 2.10 Ports and LEDs of TEPRI2 2-15
Table 2.11 Ports and LEDs of 4BRI 2-16
Table 2.12 Ports and LEDs of 8TRK 2-17
Table 2.12 Ports and LEDs of 8TRK2 2-18
Table 2.10 Ports and LEDs of the 16TRK Board 2-19
Table 2.13 Ports and LEDs of 8DLI 2-20
Table 2.14 Ports and LEDs of 8COMBO/8COMBO2 2-21
Table 2.15 Ports and LEDs of the 8SLI Board ..... **Error! Bookmark not defined.**
Table 2.16 Ports and LEDs of the 8SLI2 Board 2-22
Table 2.17 Ports of 16MWSLI/16SLI2 2-23
Table 2.18 Ports of 16DLI2 2-24
Table 2.19 Ports and LEDs of LIM 2-26
Table 2.20 Ports and LEDs of PLIM 2-28
Table 2.21 Ports and LEDs of the PLIM2 Board 2-29
Table 2.22 Ports and LEDs of GPLIMT ..... **Error! Bookmark not defined.**
Table 2.23 Ports and LEDs of GPLIMT 2-31
Table 2.24 Ports and LEDs of GSIM 2-32
Table 2.25 Ports and LEDs of GSIMT 2-34
Table 2.26 Ports and LEDs of GWIM ..... **Error! Bookmark not defined.**
Table 2.27 Ports and LEDs of GWIMT 2-36
Table 2.28 Ports and LEDs of 4DSL ..... **Error! Bookmark not defined.**
Table 2.29 Ports and LED of MGI ..... **Error! Bookmark not defined.**

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Table 2.30 Ports and LEDs of MGI64/MGI16 2-38
Table 2.31 Main Module of SVMi-20E 2-45

Table 3.1 OfficeServ 7400 Capacity 3-1
Table 3.2 Trunk Line Capacity 3-3
Table 3.3 Station Line Capacity 3-3
Table 3.4 Channels of Each Slot 3-3
Table 3.5 Electrical Characteristics of the T1 Trunk Line 3-4
Table 3.6 Electrical Characteristics of the E1 Trunk Line 3-5
Table 3.7 Electrical Characteristics of the BRI Trunk Line 3-5
Table 3.8 Electrical Characteristics of the PRI Trunk Line 3-6
Table 3.9 Electrical Characteristics of the DLI Line 3-6
Table 3.10 Electrical Characteristics of the GWIM/GWIMT Interface (V.35 Interface) 3-7
Table 3.11 Electrical Characteristics of the GWIM/GWIMT Interface (RS-232C Interface) 3-7
Table 3.12 Electrical Characteristics of the GWIM/GWIMT Interface (HSSI Interface) 3-7
Table 3.13 Electrical Characteristics of the LAN Interface (10 Base-T) 3-8
Table 3.14 Electrical Characteristics of the LAN Interface (100 Base-Tx) 3-8
Table 3.15 Electrical Characteristics of LAN Interface (1000 BASE-TX) 3-9
Table 3.16 Electrical Characteristics of LAN Interface (1000 BASE-FX) 3-9
Table 3.17 1000 BASE-SX/LX Optical Fiber 3-10
Table 3.18 Electrical Characteristics of the VDSL Interface 3-11
Table 3.19 I/O Voltage of PSU 3-13
Table 3.20 Cycles of System Ring 3-14
Table 3.21 Cycles of the System Tones 3-14
Table 3.22 OfficeServ 7400 Compatible Terminals 3-15
Table 3.23 OfficeServ 7000 Series Port Number 3-17
Table 3.24 OfficeServ Solution Port Number 3-19

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CHAPTER 1. Overview of OfficeServ 7400

This chapter describes the features and the main functions of OfficeServ 7400 overall and introduces System Structure, Interface and Programming.

1.1 Introduction to System

OfficeServ 7400 is the most proper communication product for mid/large-sized offices and provides the complex function including voice, data and internet functions.
OfficeServ 7400, also, provides the data exchange function using data network as well as the voice call function. Users can enjoy various phone functions and applications at the various platforms such as digital phones, IP phones, mobile phones, PCs and servers.

1.1.1 Main Functions

Main functions and features of OfficeServ 7400 are as follows:

Integrated Communication Environment

OfficeServ 7400 provides the data transmission service by using Local Area Network (LAN), Wide Area Network (WAN) modules as well as the voice call function. Users can conveniently communicate by using wireless/wired integration platforms (Telephones, PCs, Wireless Phones and peripherals) function.

High Quality IP Phone Function

OfficeServ 7400 separates the priority of data packets and voice packets from grouping so that it guarantees the following Quality of Service (QoS) in voice call:

- Layer 2 QoS: Priority Processing (802.1p), VLAN (802.1q)
- Layer 3 QoS: Class Based Queuing (CBQ), Real-time Transmission Protocol (RTP) Priority Queuing, On-Demand Bandwidth management for WAN.

WAN and LAN Functions

OfficeServ 7400 is equipped with WAN and LAN interface modules so that it can exchange data with external Internet and internal Intranet via 10/100 BASE-T or 1000 BASE-TX/SX/LX interface without additional data equipment.

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Wireless LAN Service

OfficeServ 7400 provides the wireless LAN solution for wireless/wired complex service in office zone. OfficeServ 7400 uses Combo Access Point (AP) that serves separated data and voices and supports hand-off and QoS. Since OfficeServ 7400 uses a wireless LAN BTS, it allows users to make wireless/wired voice/data communication and access Internet. Also, an efficient and convenient working environment can be made at any time or place because sophisticated mobile stations are used for the 7400.

A Variety of Application Solutions

OfficeServ 7400 offers a variety of application solutions such as OfficeServ News, OfficeServ EasySet, Internet Call Center, R-NMS, On-module Voice Mail Solutions, Integrated Fax Server, and Digital Integrated Recording Systems.

NOTE

Integrated and Application Solution

- 'Integrated' means that OfficeServ 7400 system inter-works with an external solution server and the system and the server operates as one integrated function.
- For detailed information about how to use each application solution, refer to the User's Guide for each application.

Convenient Installation and Expandability

OfficeServ 7400 can be conveniently installed as follows: the basic chassis and expansion chassis of the OfficeServ 7400 are mounted on the 19-inch rack. Multiple service modules can be expanded or installed in the universal slot. If needed, you can mount or demount those service boards (excluding MP40 and LP40) during system operation. The applicable systems and boards are represented in blue initials (OfficeServ 7400 WIM).
(should respect the installation manual's board replacement condition)

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1.1.2 System Architecture

OfficeServ 7400 is configured with the basic chassis and expansion chassis mounted on the 19-inch rack as well as OfficeServ feature server mounted on the external Linux server. The Main Control Processor 40 (MP40) module, which is the main control part, is installed into the basic chassis and manages the entire OfficeServ 7400. The Line Control Processor 40 (LP 40), which is the sub-control part, is installed into the basic/expansion chassis, controls modules and sends/receives data to/from the MP40. The other components are modules, the power supply, and a fan.
OfficeServ 7400 is consisted of 5 categories.

- Call Server: Module to do voice service such as MP 40, LP 40, DLI, SLI, Trunk
- Data Server: Module to do data service such as GSIM, PLIM,LIM
- Feature Server: Linux application to do voice service in IP such as OfficeServ IP-UMS
- OfficeServ Admin: PC application to manage Call Server such as OfficeServ Easyset, WebMMC
- OfficeServ Solution: PC application to manage high-class voice services that be linked with Call Server such as OfficeServ Call, Operator

The service configuration diagram of the OfficeServ 7400 system is shown in the figure below:

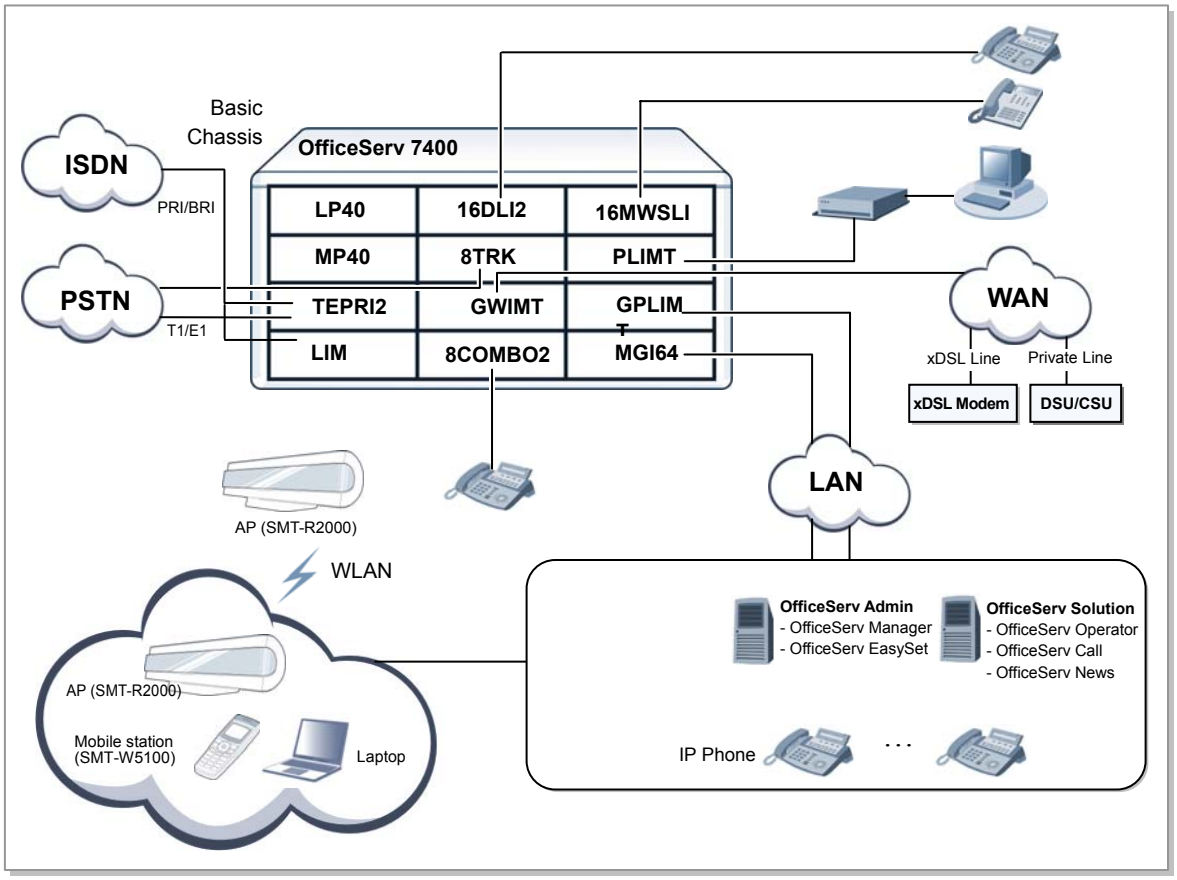

Figure 1.1 Configuration of OfficeServ 7400 Service

Voice Trunk Line Part

The voice trunk line part is configured with digital trunk lines and analog trunk lines. TEPRIa/TEPRI2 functions as E1, T1 and Primary Rate Interface (PRI) digital trunk line on a module, sends/receives voices through the trunk line and transmits the data information of 64 kbps per channel. The 8Trunk (8TRK),8TRK2,16TRK functions as Polarity Reverse Detection (PRS) and Caller ID (CID) provides the Metering Pulse Detection function in option. (The 8TKR2/16TRK do not support the MPD function)
In addition, it sends/receives voices as analog trunk line function and transmits the data information of 64 kbps per channel.

Voice Station Part

The voice station part is configured with Digital Line Interface (DLI), which is a digital station, and Subscriber Line Interface (SLI), which is an analog station, and provides voice services and provides the voice service. Multiple station modules can be mounted depending on the combination of port numbers and stations. Examples of the digital station have the 16DLI2 and 8DLI modules. Those of the analog station have the 16MWSLI and 16SLI2, 8SLI2 modules.
In addition, the combo-type 8COMBO2 which is the combination of analog and digital stations, exists.

Data Transmission Part

The data module is configured with the GWIMT, which is a WAN interface module, and the LIM/PLIM/PLIM2/GSIM /GPLIMT/GSIMT, which is a LAN interface module. The LIM/PLIM/PLIM2 module sends or receives data to/from internal Intranet, provides 10/100 BASE-T interface and functions as a switching hub.
The PLIM/PLIM2 module provides the Integrated Power over Ethernet (Integrated PoE) function. The GPLIMT provides the Layer 2 LAN interface to support internal data networks and serves 10/100 BASE-T Fast Ethernet (FE) and 1000 BASE-TX/SX/LX interface for data transmission (GPIMT supports 10/100 BASE-T FE and 10/100/1000 BASE-TX). The GSIM/GSIMT module provides the Gigabit LAN interface of Layer 2 and Layer 3 to support data networks and serves the 1000 BASE-TX/SX/LX interface (GSIMT only supports 10/100/1000 BASE-TX).
The GWIMT, which is a Gigabit router board for data communication with external Internet, provides the WAN interface to support data networks.

NOTE

Board Name Abbreviations

GWIMT: Gigabit WAN Interface Module TX
LIM: LAN Interface Module
PLIM: PoE LAN Interface Module
PLIM2: PoE LAN Interface Module version 2
GPLIMT: Gigabit PoE LAN Interface Module TX
GSIM: Gigabit Switch Internet Module

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Voice Application Part

The voice application module provides the VoIP (Voice over Internet Protocol) function that transmits voice to the data network. The data network consists of the Local Area Network (LAN) or the Wireless Local Area Network (WLAN).
The Media Gateway Interface 16channel (MGI16)/Media Gateway Interface 64channel (MGI64) board offers the VoIP function by converting voices into data.

Configuration of the Application

The OfficeServ 7400 has a commercial server in the outside of its chassis and provides the application software below.

- OfficeServ Solutions
- Installation Tool
- OfficeServ NMS

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1.2 Interface

This section describes the interfaces between the sub-modules of OfficeServ 7400 and the ones between the VoIP elements.

1.2.1 Interfaces between Sub-modules

Table 1.1 Interface between Sub Modules

Categories	Types	Interfaces
LIM/PLIM/ PLIM2 Interface	Physical Access	IEEE 802.3 10 BASE-TX, IEEE 802.3u 100 BASE-TX
	Connector Type	RJ-45
GPLIMT Interface	Physical Access	IEEE 802.3 10 BASE-TX, IEEE 802.3u 100 BASE-TX, IEEE 802.3z 1000 BASE-SX/LX, IEEE 802.3ab 1000 BASE-TX
	Connector Type	RJ-45, SFP (Small Form-factor Pluggable Connector)
GSIM GSIMT Interface	Physical Access	IEEE 802.3z 1000 BASE-SX/LX, IEEE 802.3ab 1000 BASE-TX, IEEE 802.3 10 BASE-TX, IEEE 802.3u 100 BASE-TX
	Connector Type	RJ-45,SFP (Small Form-factor Pluggable Connector)
GWIMT Interface	Physical Access	IEEE 802.3z 1000 BASE-SX/LX, IEEE 802.3 10 BASE-TX, IEEE 802.3u 100 BASE-TX, IEEE 802.3ab 1000 BASE-TX, V.35 (T1/E1), HSSI (T3/E3)
	Connector Type	RJ-45,SFP, Serial 26-pin connector (non-standard cable), Serial 50-pin connector
	Access Protocol	- PPPoE (PPP over Ethernet), PPP (Point to Point Protocol) - DHCP (Dynamic Host Configuration Protocol) - HDLC (High-level Data Link Control) - Frame Relay
PSTN Interface	Physical Access	T1, E1, FXO (Foreign Exchange Office)
	Connector Type	RJ-45
	Access Protocol	T1, E1, Loop Start
ISDN Interface	Physical Access	ISDN PRI
	Connector Type	RJ-45
	Access Protocol	ISDN PRI
xDSL/Cable Modem Interface	Physical Access	IEEE 802.3u 100 BASE-TX Ethernet
	Connector Type	RJ-45
	Access Protocol	PPPoE and DHCP
Voice Terminal Interface	Analog Phone	FXS (Foreign Exchange Station)
	Digital Phone	SAMSUNG's Digital Phone
	Wireless LAN AP (Access Point)	802.11b

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Table 1.1 Interface between Sub-Modules (Continued)

Categories	Types	Interfaces
Interface between Call Server and Data Server (GSIM)	Physical Access	DPRAM (Dual Port RAM)
	Signal Process	IPC (Inter Processor Communication) Message
	Access Protocol	Samsung Proprietary Message
Interface between Call Server and System Manager	Physical Access	100 BASE-TX Ethernet
	Signal Process	TCP/IP
	Access Protocol	TCP, UDP IPC
Interface between Data Server and Feature Server	Physical Access	100 BASE-TX Ethernet
	Signal Process	TCP/IP
	Access Protocol	DHCP
Interface between Data Server and System Manager	Physical Access	100 BASE-TX Ethernet
	Signal Process	TCP/IP
	Access Protocol	TCP, UDP IPC
Interface between Feature Server and System Manager	Physical Access	100 BASE-TX Ethernet
	Signal Process	TCP/IP
	Access Protocol	TCP, UDP IPC
Interface Between Call Server and SIP Server	Physical Access	100 BASE-TX Ethernet
	Signal Process	SIP
	Access Protocol	TCP, UDP, IPC
Interface Between Call Server and Application	Physical Access	100 BASE-TX Ethernet
	Signal Process	TCP/IP
	Access Protocol	TCP, UDP, IPC

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1.2.2 Interfaces between VoIP Components

OfficeServ 7400 provides various VoIP interfaces as follows:

- VoIP Networking
- H.323 VoIP Gateway
- SIP VoIP Gateway
- System SIP User Agent (UA)
- IP Telephone

In view of signal processing, the interface interworking standards between VoIP components are as follows:

- Proprietary TCP Inter Protocol Communication (IPC)
- SIP UA-to-UA

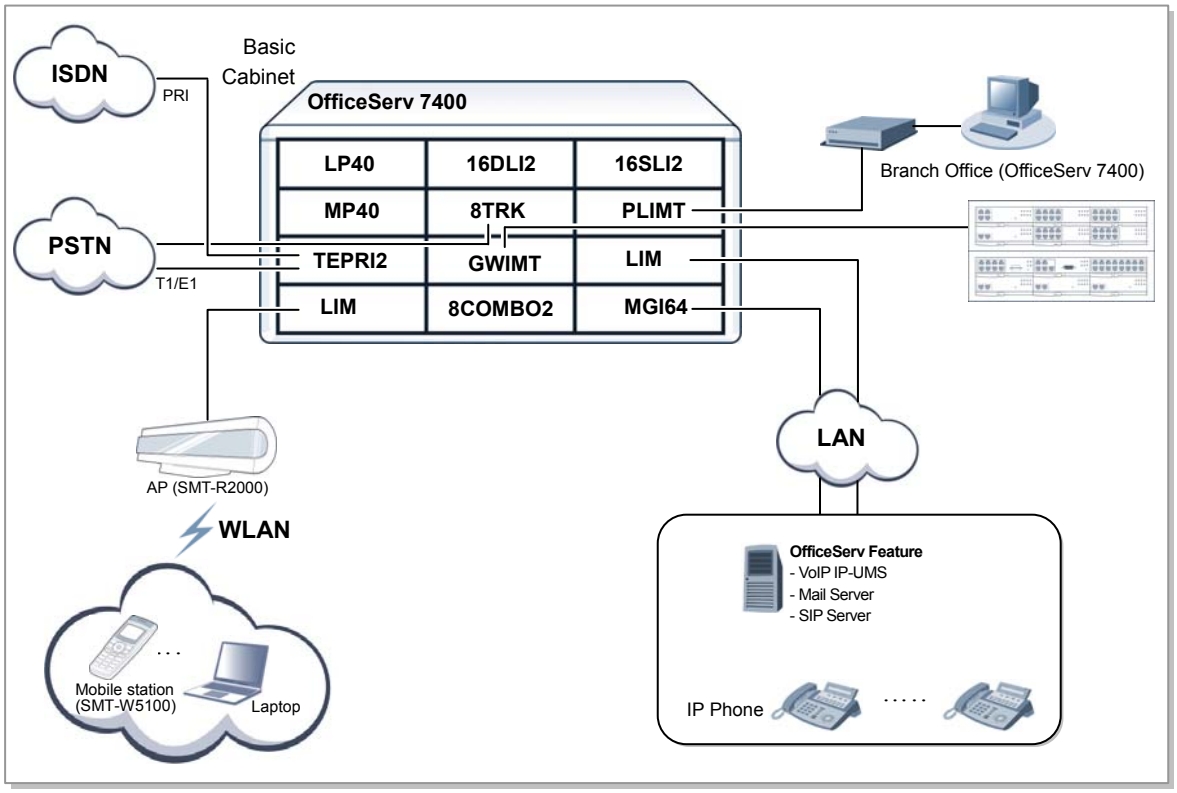

Figure 1.2 Interface between VoIP Components

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1.3 Programming

The Man Machine Communication (MMC) program can change the data value used for the system operation program. The MMC program is categorized into 3 levels, which are technician, operator, and subscriber. Depending on these levels, some MMCs can be programmed by the subscribers while some MMCs cannot.
A password is required for technician level programming or operator level programming; however, a password is not required for subscriber level programming.

Technician-Level Programming

All programs are programmable.
Programming can be made in any stations in the OfficeServ system, but the programming can be made only in a station at the same time.

Operator Level Program

The operator can program only the program specified in 'Specification of Program 802 Operator Program Range' by a technician.
Programming can be made in any stations in the tenant group, but the programming can be only made in a station at the same time.

Subscriber Level Program

Only subscriber programs are programmable.

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CHAPTER 2. Hardware of OfficeServ 7400

This chapter introduces the hardware features, chassis configuration, and module functions and configuration of the OfficeServ 7400 system. In addition, this chapter describes terminals, wireless LAN equipment, and additional equipment available in the OfficeServ 7400 system.

2.1 Features of Hardware

The Hardware of OfficeServ 7400 has the following features:

Safety

The materials and parts used for the OfficeServ 7400 hardware are robust and satisfy the mechanical and electric features required for communication systems.

- The chassis of the OfficeServ 7400 complies with the industrial standards and is assembled by robust and stable metal welding.
- The OfficeServ 7400 hardware does not generate poisonous or corrosive gas, which might be harmful for human bodies or affect the system operation.
- The OfficeServ 7400 hardware is made of materials considering the feature of Electro-Magnetic Interference (EMI).
- The OfficeServ 7400 hardware has a failure-tolerance to protect the system from the damage caused by over-voltage.
- All modules mounted on OfficeServ 7400 system can not support the ‘hot-swap’ function, so turn off the power when installing/uninstalling modules.

Modularity

The OfficeServ 7400 hardware has functional modules.

- Each module can be easily installed or removed in the plug-in way.

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Maintenance

The OfficeServ 7400 hardware is designed to be maintained with ease and safety.

- The specification of 19-inch rack is observed. The rack is designed to maintain sufficient strength.
- The installers or maintainers can connect cable easily because the ports to be connected to outside are placed on the front panel.
- The front of each module has a LED that indicates failures or operation status so that the operator can easily identify system failures.
- The back of the rack has a ground hole to which a wrist strap for preventing static electricity can be connected.
- The OfficeServ 7400 hardware is designed to protect electronic devices from damages caused by external environment while installing or recovering.
- During the operation of the system, the operator may mount or demount the service boards (except MP40, LP40) if necessary. The applicable systems and boards are represented in blue initials (OfficeServ 7400 WIM).
  (should respect the installation manual's board replacement condition).

Fire Resistance and Heat Processing

The OfficeServ 7400 hardware is made of fire-resistant materials and parts to protect the hardware from fire. The OfficeServ 7400 hardware is designed not to affect system performance due to heat generated from inside of the system.

- A specific heat-generated part of the hardware is blocked in order not to affect temperature-sensitive components.
- 4 fans (80 mm) for cooling are installed to exhale internal air to outside.
- The parts installed into the modules are located on the basis of heat distribution.

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2.2 Chassis Configuration

OfficeServ 7400 consists of 3 chassis (basic/expansion chassis) mounted on the 19-inch rack and a functional server that operates externally.
The Main Control Processor 40 (MP40) module, which is the main control part, is installed into the basic chassis to manage the entire OfficeServ 7400 and performs the switching, the signal processing and subscriber station management functions. The LP40, which is the sub control part and is installed into the basic/expanded chassis, controls various line modules and sends/receives information to/from the MP40. The other components are modules, the power supply, and fans.

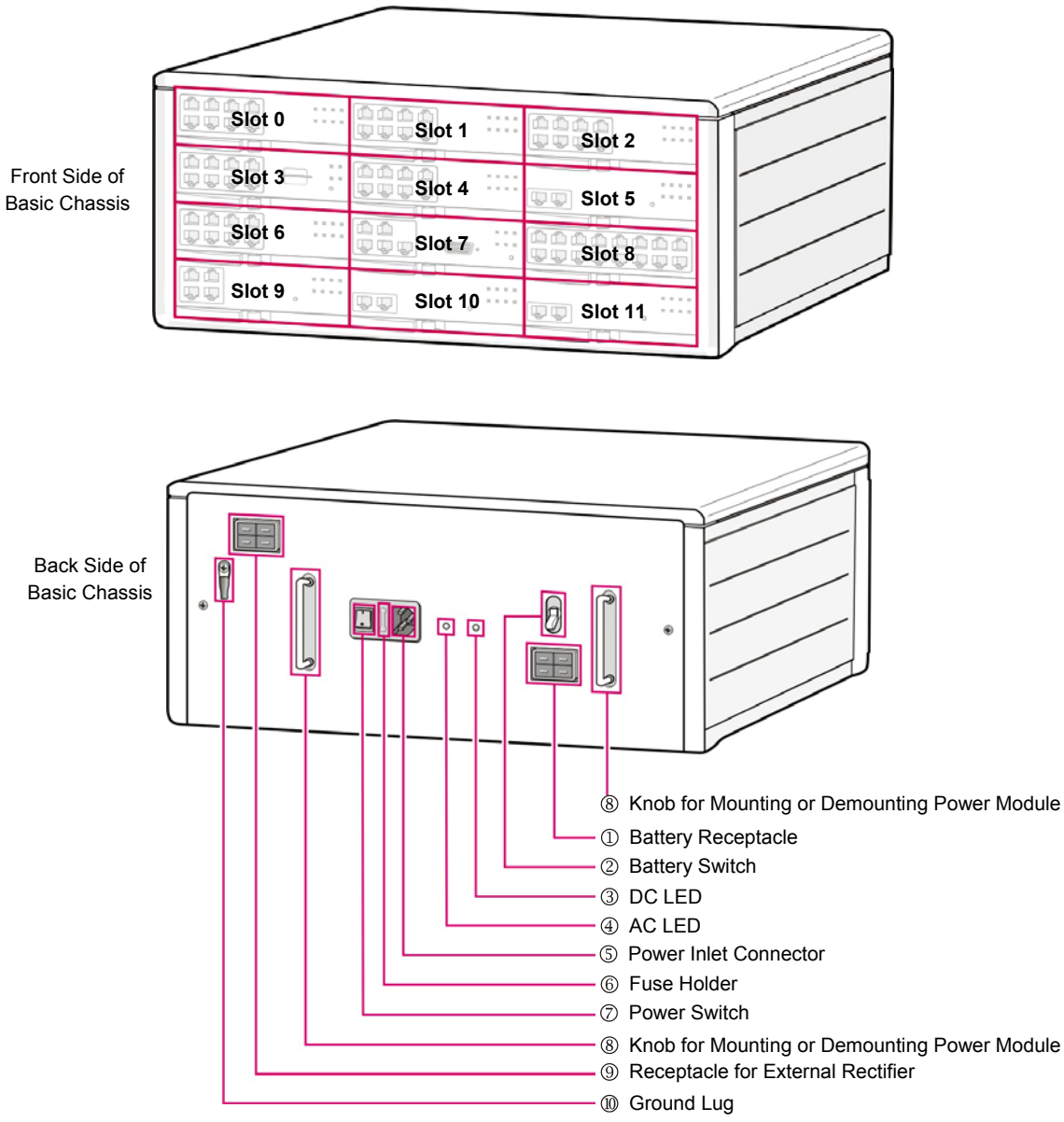

Figure 2.1 Configuration of OfficeServ 7400 Chassis

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Table 2.1 Configuration in the Back side of OfficeServ 7400

Part	Function
① Battery Receptacle	Receptacle for an external battery.
② Battery Switch	Switch to supply the power to OfficeServ 7400 or charge an battery
③ DC LED	The LED indicates the normal output of DC power.
④ AC LED	The LED indicates the input of AC power.
⑤ Power Inlet Connector	Connector for power cable
⑥ Fuse Holder	Fuse to protect AC input power
⑦ Power Switch	Power-on/off of OfficeServ 7400
⑧ Knob for Mounting or Demounting Power Module	Knob to mount or demount power module
⑨ Receptacle for External Rectifier	Receptacle to supply external DC power for Power over Ethernet (PoE)
⑩ Ground Lug	Lug for grounding system communication

2.2.1 Configuration of Slots

Each of the basic chassis and expansion chassis has 12 slots on which modules can be mounted. The modules below are mounted on the slots depending on the configuration type of the OfficeServ 7400:

Table 2.2 Modules that can be mounted on the slots

Chassis	Slots	Mountable Modules
Basic Chassis (OfficeServ Access)	Slot 0	Special purpose for LP40
	Slot 3	Special purpose for MP40
	Slot 1 and 2 Slot 4~11	Modules except MP40 and LP40
Expansion Chassis (OfficeServ Expansion)	Slot 0	Special purpose for LP40
	Slot 3	Boards excluding LIM, PLIM, and PLIM2
	Slot 1, 2, 4~11	Modules except MP40 and LP40

For using total capacity of TEPRI2 and MGI64, basic chassis that supports 64 channels per slot is used.

NOTE

Blank Module Function

Blank module is a dummy module that functions as a screen to prevent the system from foreign materials when the Universal Slot is not equipped modules.

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2.3 Modules by Functions

Each of the basic chassis and the expansion chassis in OfficeServ 7400 has 12 slots that can mount modules. Each slot can mount the modules below that can perform the following function depending on the configuration type of OfficeServ 7400.

Table 2.3 Modules by Functions

Functions	Modules
Main Control Part	Basic Chassis: MP40 (Option Module: Modem) Each Chassis: LP40 (Option Module: RCM2, CRM and MIS)
Voice Trunk Line	TEPRIa, TEPRI2, 4BRI, 8TRK, 8TRK2, 16TRK
Voice Station	8DLI, 8COMBO2, 8SLI2, 16MWSLI, 16SLI2, 16DLI2
Data	LIM, PLIM, PLIM2, GPLIMT, GSIM, GSIMT, GWIMT (Option Module: GWIMS)
Voice Application	MGI64, MGI16, OAS, CNF24
VMS	SVMi-20E
Power, Fan	PSU and Fan

2.3.1 Control Module

This paragraph describes the configuration and the functions of MP40, which is the main control module that controls all functions of the OfficeServ 7400, and those of LP40, which is the sub control module.

2.3.1.1 MP40 (Main Control Module)

MP40 is the main control module that controls all functions of the OfficeServ 7400 and is mounted on Slot 3 of the basic chassis. The MP40 performs voice switching, signal processing, and subscriber's station management functions.
The MP40 controls the entire system, performs system booting and data management functions. In addition, the MP40 recognizes/monitors/controls the modules mounted on the universal slot of the expansion chassis through IPC by connecting to the LP40 that is a control module in expansion chassis of OfficeServ 7400 or the LCP that is a control module in expansion chassis of OfficeServ 7200.

The MP40 connected to Ethernet network via the LAN Interface of the front panel to drive various applications. The flexibility of the system is improved by accommodating the VoIP function and the load of the system is balanced by using a control module for each chassis. IPC between chassis uses HDLC protocol to increase the reliability.

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Main Functions

The MP40 module offers the following functions:

- Various application operations via LAN interface
- Convenient installation via SmartMedia (MMC)
- Database backup
- Port for Universal Asynchronous Receiver and Transmitter (UART) test
- Internal Music On Hold (MOH) functions
- Time setup and display function
- Digital Phase Locked Loop (DPLL) for the synchronization with digital subscribers

Option Module

The MP40 module can mount a MODEM Module in option.
The MODEM module has the following functions:

- MP40 module has a 2-Wire Full Duplex modem and can commonly use it with OfficeServ 500 system. Be careful of the direction of the Modem module when mounting/demounting the module to the MP40 module.
- The Modem module operates in OfficeServ 7400 via V.23 interface and uses a modem chip for Central Office, which can perform Pulse Code Modulation (PCM) highway interface. In addition, the Modem module supports V.90 protocol. OfficeServ 7400 controls the Modem module via serial communication using standard AT commands.

Specification

The specification of MP40 control module is as follows:

Table 2.4 Specification of MP40

Categories	Names	Standards
CPU	Processor	MPC8271ZQMIBA
	System Clock	266 MHz
	Package	516 BGA
SDRAM (Memory for programs and data)	Capacity	128 MByte (32 MByte x 4 EA), 256 MByte extendable
	Width of Data Bus	64 bit
SRAM (Memory for Data)	Capacity	2 MByte (1 MByte x 2 EA)
	Width of Data Bus	32 bit
Flash ROM (For Booting)	Capacity	1 MByte (512 KByte x 2 EA)
	Width of Data Bus	8 bit

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Table 2.4 Specification of MP40 Module (Continued)

Categories	Names	Standards
Time Switch	Device	ZL50018
	Basic Switch	2048x2048 Channel
	Data Bus Width	16 bit
RTC	Device	RTC8564NB
	Time for Backup	24 Hours
Memory Card (Memory for programs and data)	Capacity	64 MByte
	Width of Data Bus	8 bit
NAND Flash ROM (Data Base memory, Backup)	Device	K9F2808U0C
	Capacity	16 MByte
EEPROM Data memory (example: MAC Address)	Capacity	1 KByte
	Interface	SPI
Engine	Device	STL7065A STC9604
	Width of Data Bus	8 bit

Front View

The front view of the MP40 main control part is as shown in the figure below.

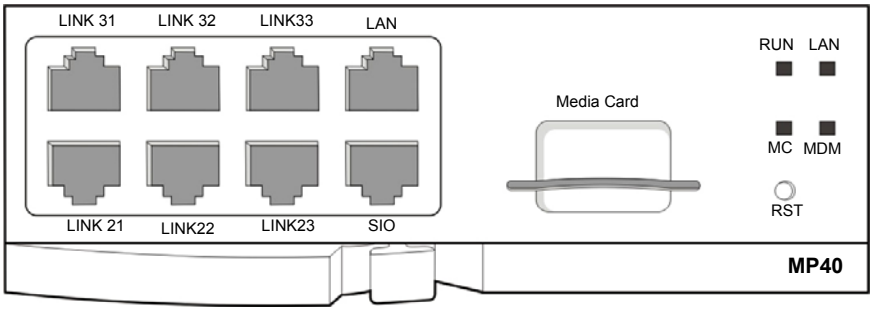

Figure 2.2 Front View of MP40

The components on the front panel of the MP40 module have the functions below:

Table 2.5 Ports of MP40

Ports, LEDs	Functions
LINK21~LINK23	Connection port between MP40 and LP40 in the first expansion chassis
LINK31~LINK33	Connection port between MP40 and LP40 in the second expansion chassis
LAN	Port to connect 10/100 BASE-T LAN
SIO	UART Port (for test) and CPLD JTAG Port (for management)
RST	Button for MP40 module reset
Media Card	Auxiliary Memory Device (NAND Flash)

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Table 2.5 Ports of MP40 (Continued)

Ports, LEDs	Functions
RUN LED	Status of MP40 operation - Off: No-power - On (Green): On Booting - Blink (Green): Normal Operation of Program The blink cycle is 500 ms while running S/W
LAN LED	Status of LAN operation - Off: No-power and no-connection of LAN port - On: The color of the LED shows the LAN transmission speed and connection speed. • On (Green): Good connection + Operation at 100 Mbps - Blink (Green): Good connection + Operation at 10 Mbps
MC LED	Memory Card Access Status - Off: No- Memory Card - On: The color of the LED shows the mounting status and the normal operation status after access. • On (Green): Mounted + Normal Operation • On (Red): Non-mounted or Mounted + Abnormal Operation - Blink (Green): Memory Card is mounted and in access mode.
MDM LED	The mounting status and the operation status of the MODEM - Off: No-MODEM - On (Green): MODEM mounted - Blink (Green): On transmitting data

2.3.1.2 LP40 (Sub-Control Section Module)

LP40 is the minor control module to controls overall functions of OfficeServ 7400 and is mounted on the slot 0 in the basic and expansion chassis. LP40 manages subscriber cards and terminals under the control of the main control module, MP40, and transfers various event signals generated in the subscriber cards and terminals to MP 40.

3 optional modules are mounted on the LP40 module. It is available to mount optional modules selectively according to a function. For the functions of the optional modules, there are DTMF, R2, CID, Conference and MISC.

Main Functions

The LP40 module provides the following functions:

- Providing LAN Interfaces (Testing Port)
- Providing testing ports for Universal Asynchronous Receiver and Transmitter (UART)
- Conference, caller information, multi-frequency detecting and door phone control
- External Music On Hold (MOH) and loud/common bell

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Optional module

For optional modules that are available to mount on the LP40 module, there are MIS, RCM2, and CRM modules.
The main functions of each optional module are as follows:

- Miscellaneous (MIS): MIS is an optional module that is mounted on LOC3 in the LP40 module. The location is indicated on the LP40 module. MIS provides the external hold sound source input ports, external paging ports, loud bell ports and common bell ports as well as 2 dry ports that connects or blocks the power supply and signal transfers with external devices.
- R2 CID Module 2 (RCM2): RCM2 is an optional module to detect and generate Caller Identification (CID). The RCM2 module is mounted on LOC1 or LOC2 in the LP40 module and the location is indicated on the LP40 module. If the RCM2 module is mounted, it is available to detect and generates CID signals from 14 channels.
  It is available to select an operation mode (detection and generated signal) as R2 or CID using the switch in the RCM2 module. Recently, the R2 function is not available and is planned to be provided in the future.
- Common Resource Module (CRM): The CRM module is an optional module to detect and generate DTMF signals and CID signals. The CRM module is mounted on LOC1 or LOC2 in the LP 40 module and the location is indicated on the LP40 module.

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Specifications

The specification of the LP40 minor control module is as follows:

Table 2.6 Specification of LP40

Category	Name	Standard
CPU	Processor	MPC852T
	System Clock	50 MHz
	Package	256P PBGA
SDRAM (For program and data storage)	Capacity	16 MByte
	Data Bus Width	32 bit
Flash ROM (For data storage)	Capacity	4 MByte
	Data Bus Width	16 Bit
Boot ROM (For booting)	Capacity	512 KByte
	Data Bus Width	8 Bit
Rate Conversion Digital Switch	Rate	2.048 ↔ 8.192 Mb/s
	Data Bus Width	16 Bit
Others	External MOH Port	2 ports

Front View

The front view of the LP40 minor control module is shown in the figure below:

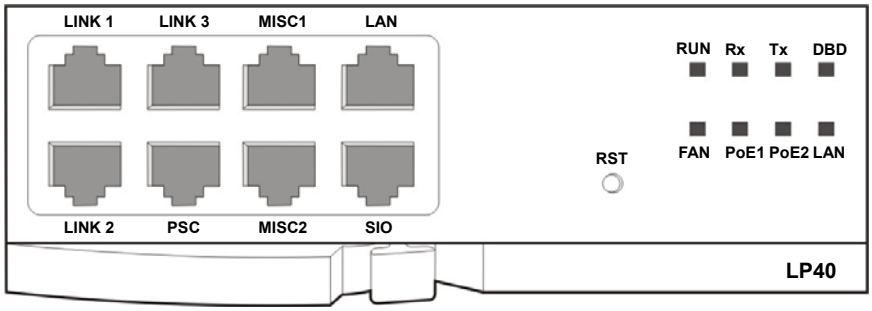

Figure 2.3 Front View of LP40

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The components on the front view have the functions below:

Table 2.7 Ports and LEDs of LP40

Port, LED	Function Description
LINK1~LINK3	Ports for connecting MP40 and LP40
MISC1~MISC2	Ports for connecting external music, paging, loud bell, common bell and door bell
PSC	Connection port for PoE power status check
LAN	Port for connecting 10/100 BASE-T LAN (for tests)
SIO	UART port (for tests), CPLD JTAG port (for management)
RST	Button for resetting LP40 module
RUN LED	Indicating the status of LP40. - Off: No power supplied or abnormal status - Orange Blink: On booting - Green Blink: Normal status
Rx LED	Indicating the status related to data receipt in communication with MP40. - Off: No signal - Green Blink: Data reception in progress
TX LED	Indicating the status related to data transmission in communication with MP40 - Off: No signal - Green Blink: Data transmission in progress
DBD LED	Indicating the daughter board mount. - Off: Daughter board dismounted - Green On: 1 daughter board or more mounted
FAN LED	Indicating the operation of FAN. - Green On: All fans normal - Red Blink: 1 FAN or more abnormal
PoE1 LED	Indicating the status of PoE1 power supply. - Off: PoE1 power supply dismounted - Green On: Normal - Red On: Abnormal
PoE2 LED	Indicating the status of PoE2 power supply. - Off: PoE2 power supply dismounted - Green On: Normal - Red On: Abnormal
LAN LED	Indicating the status of LAN. - Off: LAN disconnected - Green Blink: Operated in 10 Mbps - Green On: Operated in 100 Mbps

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2.3.2 Voice Trunk Line Module

This section describes the modules that offer the voice service of trunk lines.

2.3.2.1 TEPRIa

The TEPRIa board provides the digital trunk line. A TEPRIa module provides E1, T1, ISDN and PRI, and functions as the Q-SIG. This module transmits voice via the trunk line; each channel supports 64 Kbps voice data transmission.

Major Functions

The TEPRIa voice trunk line board performs the functions below:

- Selection function for T1/E1/PRI signal process through programming
- Function of a resistance circuit that satisfies both of the T1 (100 Ω) and E1 (120 Ω)
- Surge protection over the standard of International Telecommunication Union (ITU)
- Output port protection for line monitors
- Provides the Jitter characteristic that meets both ITU-T I.431 and G.703.
- Provides selectable line encoding methods (HDB3, AMI)
- Local/remote loop function
- Function for the HDLC or Common Associated Signaling (CAS) through the Common Channel Signaling (CCS)

Specification

The specifications of the TEPRIa voice trunk line module are as follows:

- Trunk Port: 1 Port
- E1: 30 Channels
- T1: 24 Channels
- PRI: 30 Channels or 23 Channels

Front View

The front view of the TEPRIa voice trunk line board is shown in the figure below

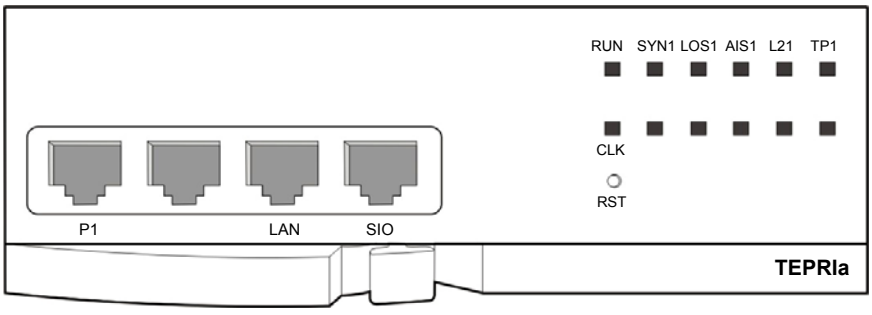

Figure 2.5 Front View of the TEPRIa Board

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The components on the front panel of the TEPRIa board have the functions below:

Table 2.9 Ports and LEDs of the TEPRIa Board

Port, LED	Details
P1	Port 1 that connects the T1/E1/PRI cable
LAN	Port that connects the 10/100 BASE-T LAN (for tests)
SIO	UART Port (for tests), CPLD JTAG Port (for managements)
RST	Button for resetting TEPRIa module
TP1 LED	Indicates the type of the program running on Port 1 - On: The Port 1 is operating in PRI mode - Off: The Port 1 is operating in T1/E1 mode
L21 LED	Indicates the operation status of Layer 2. - On: The Layer 2 is operating properly - Off: The Layer 2 is operating abnormally
AIS1 LED	Indicates whether the board received the alarm bit of the opposite switchboard. - On: The board received the alarm bit of the opposite switchboard - Off: The board did not receive the alarm bit of the opposite switchboard
LOS1 LED	Indicates whether the opposite switchboard has a Loss of Signal (LOS). - On: The opposite switchboard signal is small or suffers from a loss of signal - Off: The opposite switchboard signal is received normally
SYN1 LED	Indicates the status of the synchronization with the opposite switchboard. - On: The frame synchronization with the opposite switchboard is incorrect - Off: The frame synchronization with the opposite switchboard is correct
RUN LED	- Green Light: When operating normally (blinks at a rate of 200 ms) - Orange Light: When operating in debug mode (blinks at a rate of 200 ms)
CLK LED	Turns on when the reference clock is used as the system clock.

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2.3.2.2 TEPRI2

TEPRI2 provides the digital trunk line. A TEPRI2 module provides 2 ports for E1, T1, ISDN and PRI respectively, and functions as the Q-SIG. This module transmits voice via the trunk line and a channel transmits the voice data of 64 Kbps.

Main Functions

The TEPRI2 voice trunk line module performs the functions below:

- Selection function for T1/E1/PRI signal process through programming
- Function of a resistance circuit that satisfies both of the T1 (100 Ω) and E1 (120 Ω)
- Surge protection over the standard of International Telecommunication Union (ITU)
- Output port protection for line monitors
- Jitter function that satisfies ITU-T I.431 and G.703
- Providing selectable line codec (HDB3, AMI)
- Local/remote loop function
- Function for the HDLC or Common Associated Signaling (CAS) through the Common Channel Signaling (CCS)

Specifications

The specifications of the TEPRI2 voice trunk line module are as follows:

- 2 trunk line ports
- E1: 30 channels per port
- T1: 24 channels per port
- PRI: 23 or 30 channels per port

Front View

The front view of the TEPRI2 voice module is shown in the figure below:

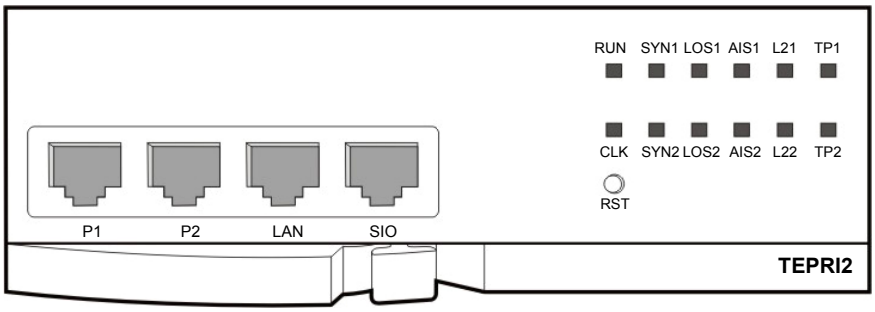

Figure 2.6 Front View of TEPRI2

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The components on the front panel of the TEPRI2 have the functions below:

Table 2.10 Ports and LEDs of TEPRI2

Port, LED	Function Description
P1	Port 1 for connecting T1/E1/PRI cables
P2	Port 2 for connecting T1/E1/PRI cables
LAN	Port for connecting to Ethernet
SIO	UART port (for tests)
RST	Button for resetting LP40 module
TP1 LED	Indicating the type of the program operated in Port 1 - On: PRI in operation - Off: T1/E1 in operation
TP2 LED	Indicating the type of the program operated in Port 2 - On: PRI in operation - Off: T1/E1 in operation
L21 LED L22 LED	Indicating the status of Layer 2 - On: Normal - Off: Abnormal
AIS1 LED AIS2 LED	Indicating the reception of the alarm bit of the counterparty switch - On: Alarm bit received - Off: Alarm bit not received
LOS1 LED LOS2 LED	Indicating the signal loss (LOS) of the counterparty switch - On: When signals are week or has been damaged - Off: When signals received properly
SYN1 LED SYN2 LED	Indicating the status of frame synchronization with the counterparty switch - On: No frame synchronized - Off: Frame synchronized
RUN LED	- Green Light: When operating normally (blinks at a rate of 200 ms) - Orange Light: When operating in debug mode (blinks at a rate of 200 ms)
CLK LED	LED turns on when the reference clock is used as a system clock.

2.3.2.3 4BRI

The 4BRI module provides 4 ports for BRI-T/S connection. It transmits voice via the trunk line and a channel transmits voice data at 64 kbps.

Main Functions

The 4BRI module performs the following functions:

- Processes T or S signals by programming.
- Processes the following signals by programming: Point to Point Normal, Point to Point DDI, Point to MultiPoint.
- Switchable Resistor Terminations (100 Ω)
- Endures the ITU-recommended level of surge.
- Protects the output port by monitoring line signals.

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- Crystal-less wanders and jitter attenuation/compensation to TR62411.
- Attenuates/compensates jitter as recommended in ITU-T I.431 and G703.
- Performs local/remote loopback for test.

Specifications

The 4BRI module has 8 line ports.

Front View

The front view of the 4BRI voice module is shown in the figure below:

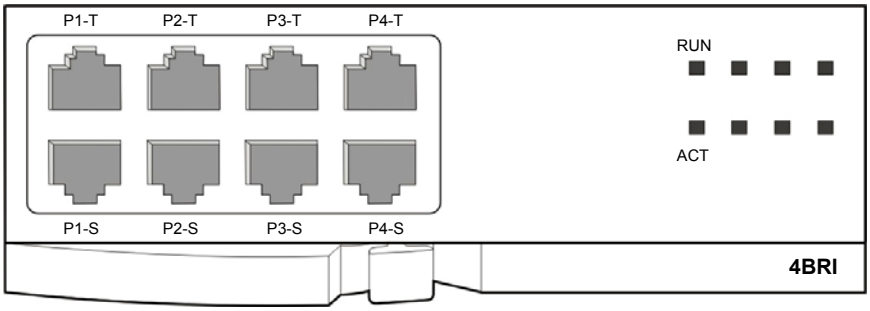

Figure 2.7 Front View of 4BRI

The components on the front panel of the 4BRI have the functions below:

Table 2.11 Ports and LEDs of 4BRI

Port, LED	Function Description
P1-T~P4-T	Office (trunk) Port
P1-S~P4-S	Internal (station) Port
RUN LED	4BRI Board Operation Status - Off: 4BRI board is abnormal or power is disconnected - Blink: 4BRI board is properly operated
ACT LED	4BRI Board LAYER1 SETUP Status - Off: LAYER1 SETUP Abnormal - On: LAYER1 SETUP Normal

2.3.2.4 8TRK

The 8TRK module has 8 ports of analog trunk lines. One module has the PRS, MPD and CID paths. In addition, the module provides voice through trunk lines and transmits the voice data of 64 kbps to each channel.

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Main Functions

The 8TRK voice trunk line module performs the functions below:

- Detecting ring reception
- Detecting on/off-hook
- Transmitting dial pulse
- PRS function
- MPD function (option)
- CID function
- Line monitoring function that checks if the line is connected periodically to transmit the voice data can be transmitted.
- Function that operates as the relay paths of caller information (When caller information is entered as 8TRK, it is available to make a path that verifies the call information in the RCM2 module by connecting the RCM2 option module to LP40)

Specifications

The 8TRK voice trunk line module has 8 trunk line ports.

Front View

The front view of the 8TRK module is shown in the figure below:

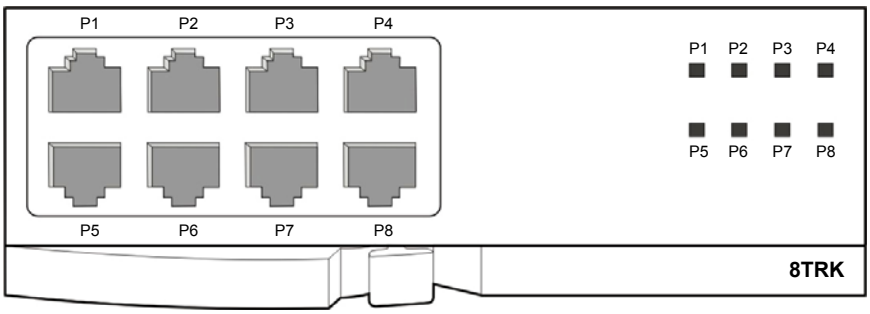

Figure 2.8 Front View of 8TRK

The components on the front panel of the 8TRK have the functions below:

Table 2.12 Ports and LEDs of 8TRK

Port, LED	Function Description
P1~P8	Trunk Ports
P1~P8 LED	The status of ports - Off: Not used - On: In use - Blink: On receiving a ring

2.3.2.5 8TRK2

The 8TRK2 board provides 8 ports of analog trunk line, and supports the PRS, CID paths. It also provides the voice though the trunk line; each channel supports 64 Kbps voice data transmission.

Major Functions

The 8TRK2 voice trunk line board performs the functions below:

- Detecting ring reception
- Adjusting the voice data according to the loop distance
- Detecting on/off-hook
- Monitoring off-hook transmission
- Transmitting dial pulse
- PRS function
- CID pass function
- Adjusting the voice signal's amplitude/frequency characteristics/return loss from the software
- A caller information relay function (if the caller information is provided through the 8TRK2, the selected switch can be converted to Caller ID (CID) from the RCM2 option board by connecting the board to the LP40)

Specification

The 8TRK2 voice trunk line board provides 8 trunk line ports.

Front View

The front view of the 8TRK2 voice trunk line board is shown in the figure below

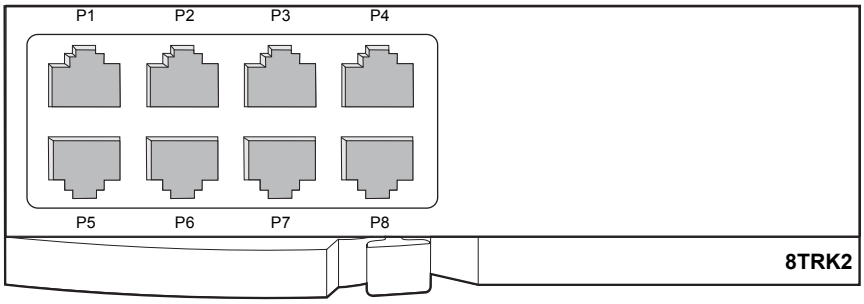

Figure 2.9 Front View of the 8TRK2 Board

Table 2.12 Ports and LEDs of 8TRK2

Port, LED	Function Description
P1~P8	Trunk Line Port

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2.3.2.6 16TRK

The 16TRK board provides 16 ports of analog trunk line, and supports the PRS, CID paths. It also provides the voice though the trunk line; each channel supports 64 Kbps voice data transmission.

Major Functions

The 16TRK voice trunk line board performs the functions below:

- Ring incoming detection function
- Adjusting the voice data according to the loop distance
- On/Off-hook detection function
- Monitoring off-hook transmission
- Transmitting dial pulse
- PRS function
- CID pass function
- Adjusting the voice signal's amplitude/frequency characteristics/return loss from the software
- A caller information relay function (if the caller information is provided through the 8TRK2, the selected switch can be converted to Caller ID (CID) from the RCM2 option board by connecting the board to the LP40)

Specification

The 16TRK voice trunk line board provides 16 trunk line ports.

Front View

The front view of the 16TRK voice trunk line board is shown in the figure below.

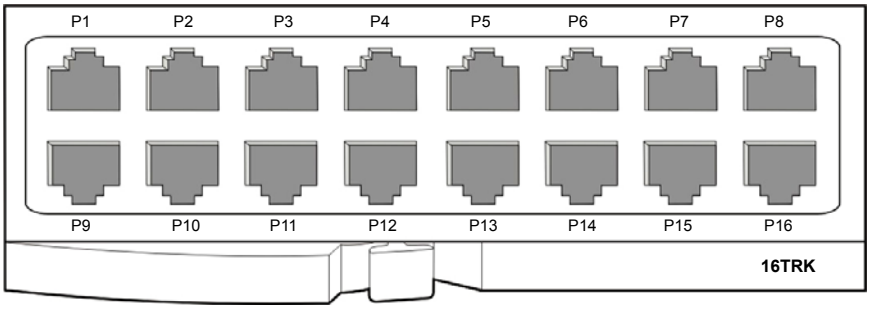

Figure 2.10 Front View of the 16TRK Board

The components on the front panel of the 16TRK board have the functions below:

Table 2.10 Ports and LEDs of the 16TRK Board

Port, LED	Function Description
P1~P16	Trunk Line Port

2.3.3 Voice Station Module

This section describes the module that offers the station voice service.

2.3.3.1 8DLI

The 8DLI (Digital Line Interface) module has 8 ports for digital stations respectively.
It interworks with Samsung digital phones via the station to provide voice communication.

Specifications

The specifications of the 8DLI voice station module are as follows:

- 8DLI Module: 8 station ports and 2B+D (2 voice channel and 1 signal channel) provided

Front View

The front view of the 8DLI voice station module is shown in the figure below:

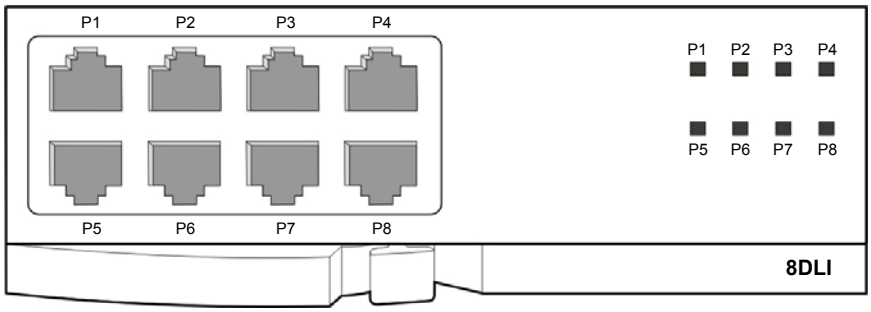

Figure 2.11 Front View of 8DLI

The components on the front panel of the 8DLI have the functions below:

Table 2.13 Ports and LEDs of 8DLI

Port, LED	Function Description
P1~P8	Station ports of Samsung digital phones
P1~P8 LED	The status of the ports - Off: Not used - On: Station in use

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2.3.3.2 8COMBO2

The 8COMBO2 module has 8 ports of analog stations and 8 ports of digital stations respectively. It interworks with regular phones or digital phones to provide voice communication.

Main Functions

The main functions of the 8COMBO2 voice station module are as follows:

- Generating the ring of 20/25 Hz
- Detecting DTMF/dial pulse
- Detecting on/off-hook
- Generating a tone

Specifications

The specifications of the 8COMBO2 voice station module are as follows:

- 8 analog station ports
- 8 digital station ports

Front View

The front view of the 8COMBO2 voice station module is shown in the figure below:

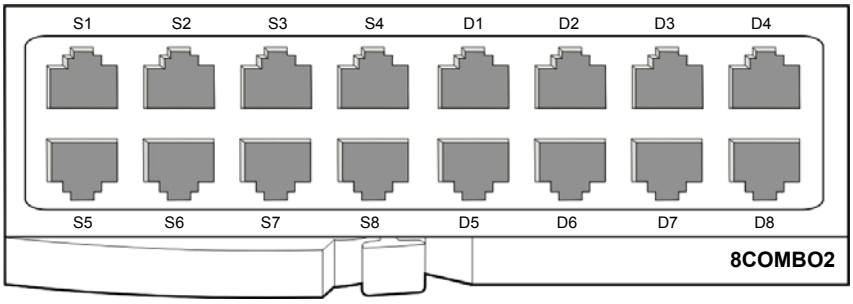

Figure 2.13 Front View of 8COMBO2

The components on the front panel of the 8COMBO2 have the functions below:

Table 2.14 Ports and LEDs of 8COMBO2

Port	Function Description
S1~S8	Analogue station ports
D1~D8	Digital station ports

2.3.3.3 8SLI2/16MWSLI/16SLI2

The 8SLI2/16MWSLI/16SLI2 module has 8 port/16 ports for analog stations.
It interworks with regular phones via the station to provide voice communication.
16MWSLI module functions as message waiting.

Main Functions

The main functions of the 8SLI2/16MWSLI/16SLI2 module are as follows:

- Generating the ring of 20 Hz
- Detecting Dial Tone Multi Frequency (DTMF)/dial pulse
- Detecting on/off-hook
- Generating a tone
- Power Fail Transfer (PFT)
- Message Waiting (16MWSLI)
- Transmitting Polarity Reverse Signal (PRS)

Specifications

The specifications of the 8SLI2 module provide 8 station ports.
The specifications of the 16MWSLI/16SLI2 module provide 16 station ports.

Front View of the 8SLI2 Board

The front view of the 8SLI2 voice local line board is shown in the figure below.

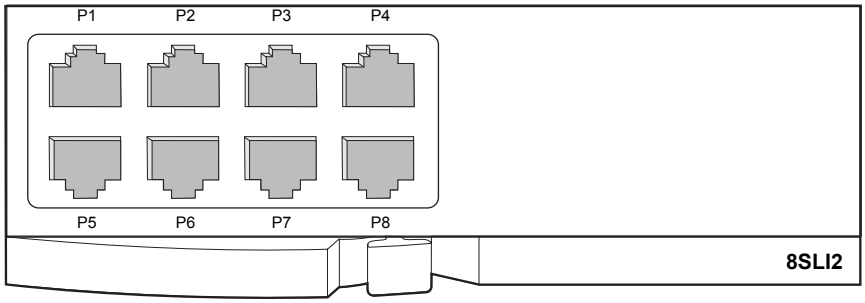

Figure 2.15 Front View of the 8SLI2 Board

The components on the front panel of the 8SLI2 board have the functions below:

Table 2.16 Ports and LEDs of the 8SLI2 Board

Port, LED	Function Description
P1~P8	local line port of regular phone

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The front view of the 16MWSLI module is shown as follows:

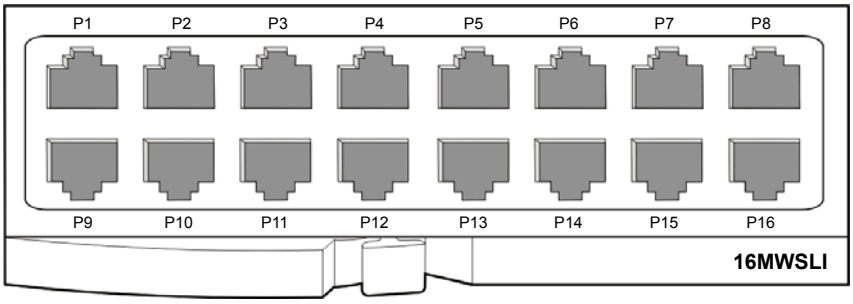

Figure 2.16 Front View of 16MWSLI

The front view of the 16SLI2 module is shown as follows:

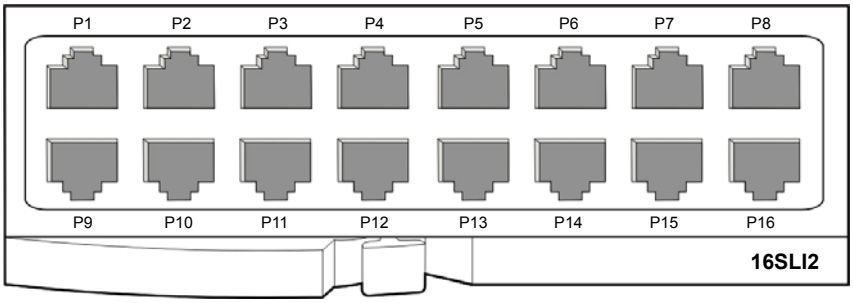

Figure 2.17 Front View of 16SLI2

The components on the front panels of the 16MWSLI/16SLI2 module has the functions below:

Table 2.17 Ports of 16MWSLI/16SLI2

Port	Function Description
P1~P16	Station Ports of Regular Phones

2.3.3.4 16DLI2

The 16DLI2 module has 16 ports for digital stations. It interworks with Samsung digital phones via the station line to provide voice communication.

Specifications

The specifications of the 16DLI2 voice station module as follows:

- 16 station ports provided
- 1B+D (1 voice channel and 1 signal channel) provided

Front View of 16DLI2

The front view of the 16DLI2 module is shown in the figure below:

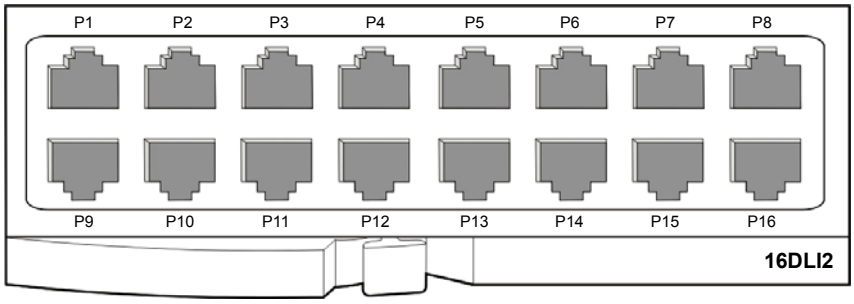

Figure 2.18 Front View of 16DLI2

The components on the front panel of the 16DLI2 have the functions below:

Table 2.18 Ports of 16DLI2

Port	Function Description
P1~P16	Station Ports of Samsung digital phones

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2.3.4 Data Server Module

This section describes the data module for transmitting/receiving data to/from Internet or Intranet.

2.3.4.1 LIM

LAN Interface Module (LIM) is a module for transmitting/receiving data on Intranet.
LAN has the interface of 10/100 BASE-T and functions as hub for switching.
The LIM (LAN Interface Module) board sends and receives data on the intranet, provides a 10/100 BASE-T interface and is operated as a switch.

Main Functions

The main functions of the LIM module are as follows:

- 10/100 BASE-T and full/half duplex auto-sensing functions
- VLAN function for QoS
- Switching Hub function
- 10/100 BASE-T, Full/Half duplex automatic detection function
- VLAN function for QoS
- Switching function

Specifications

The LIM data module provides 16 10/100 BASE-T ports.

Front View

The front view of the LIM data module is shown in the figure below:

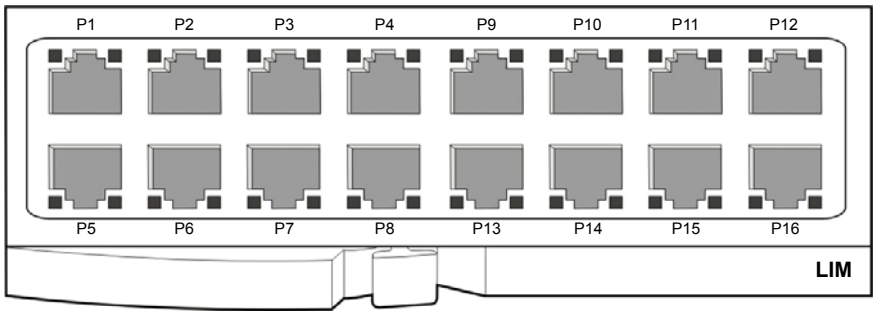

Figure 2.19 Front View of LIM

The components on the front panel of the LIM/PLIM functions as follows:

Table 2.19 Ports and LEDs of LIM

Port, LED	Function Description
P1~P16	Ports for connecting to Ethernet
Left LED of each port	Link Operation - Blink: Link in operation
Right LED of each port	10/100 BASE-T Operation - Off: Operated in 10 BASE-T - On: Operated in 100 BASE-TX

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2.3.4.2 PLIM

PoE LAN Interface Module (PLIM) is a module that transmits and receives data in Intranet and provides 10/100 BASE-T interface. In addition, this module functions as Power over Ethernet (PoE) that provides 48 V~54 V power to outside and a hub for switching.
PoE LAN Interface Module (PLIM) is a module that transmits and receives data in Intranet and provides 10/100 BASE-T interface. In addition, this module functions as Power over Ethernet (PoE) that provides 48 V~54 V power to outside as well as a switch.

Main Functions

The main functions of the LIM data module are as follows:

- 10/100 BASE-T and Full/Half duplex auto-sensing functions
- VLAN function for QoS
- Switching hub function
- PoE function

NOTE

Setting PLIM Module

PLIM can select the internal PSU (connecting shunt pin 1 and 2) or external rectifier (connecting shunt pin 2 and 3) using the shunt pins (J1, J2, J3). For the details for connecting the shunt pins, see ‘OfficeServ 7400 Installation Manual’.

Specifications

The PLIM data module provides 16 10/100 BASE-T ports.

Front View

The front view of the PLIM data module is shown in the figure below:

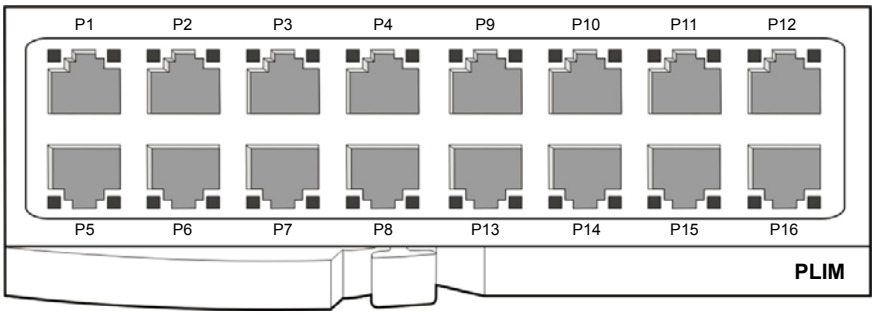

Figure 2.20 Front View of PLIM

The components on the front panel of PLIM are as follows:

Table 2.20 Ports and LEDs of PLIM

Port, LED	Function Description
P1~P16	Ports for connecting to Ethernet
Left LED of each port	Link Operation - Blink: Link in operation
Right LED of each port	10/100 BASE-T Operation - Off: 10 BASE-T in operation - On: 100 BASE-TX in operation

2.3.4.3 PLIM2

The PLIM2 boards transmits the data through the intranet, and provides a 10/100 BASE-T interface. In addition, this module functions as Power over Ethernet (PoE) that provides 48 V power to outside and a hub for switching.

Major Functions

The major functions of the PLIM2 data board are as follows.

- 10/100 BASE-T, Full/Half duplex automatic detection function
- Switching hub function
- PoE function

Setting PLIM2 board
Using the shunt pin (J1, J2, J3), the PLIM2 board can select from the internal PSU (connect shunt pin no. 1-2) and the external rectifier (connect shunt pin no. 2-3). Refer to the 'OfficeServ 7200 Installation Manual' for more details concerning the connection of the shunt pin.

Specification

The PLIM2 data board provides 16 10/100 BASE-T ports.

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Front View

The front view of the PLIM2 data board is shown in the figure below.

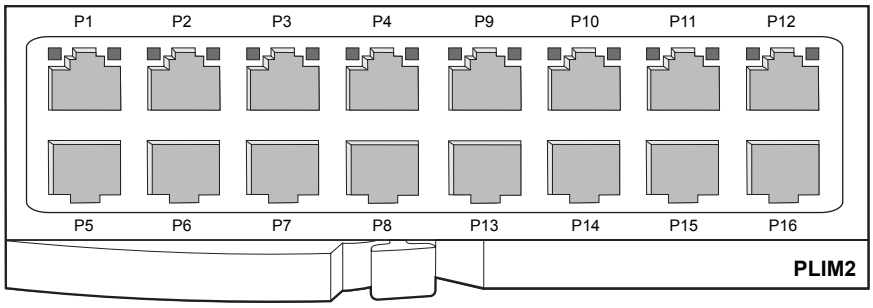

Figure 2.21 Front View of the PLIM2 Board

The components on the front panel of the PLIM2 board have the functions below:

Table 2.21 Ports and LEDs of the PLIM2 Board

Port, LED	Function Description
P1~P16	Port that connects to the Ethernet
Left LED of P1~P4, P9~P12	First LED: Indicates if the P1~P4, P9~P12's link is operating - On: When the link is operating, LED is turned on into green color - Blink: When each port is active, the LED is blinking Second LED: Indicates whether the P1~P4, P9~P12 are operating in 10/100 BASE-T mode - Off: In operation as 10 BASE-T - On: In operation as 100 BASE-TX
Right LED of P1~P4, P9~P12	First LED: Indicates if the P5~P8, P13~P16's link is operating - On: When the link is operating, LED is turned on into green color - Blink: When each port is active, the LED is blinking Second LED: Indicates whether the P5~P8, P13~P16 are operating in 10/100 BASE-T mode - Off: In operation as 10 BASE-T - On: In operation as 100 BASE-TX

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2.3.4.4 GPLIMT

Gigabit PoE LAN Interface Module TX (GPLIMT) is a module that transmits and receives data in Intranet. This module provides 12-10/100 BASE-T interface port and 2-10/100/1000 BASE-TX port as the GbE interface is added comparing to the PLIM module. GPLIMT functions as a hub for simple switching and provides VLAN function for supporting QoS interworking with GWIMT in the same module.
The GPLIMT acts as a Managed Switch and provides functions such as VLAN, QoS and RSTP.

Main Functions

The main functions of the GPLIMT data module are as follows:

- L2 Ethernet Switching
- 10/100 BASE Full/Half duplex auto-sensing
- Spanning Tree Protocol (RSTP)
- VLAN Networking (802.1q)
- Packet Priority Control (802.1p)
- Flow Control (802.3x)
- Multi-casting (IGMP Snooping)
- IEEE 802.3af Power over Ethernet (PoE)

Specifications

The specifications of the GPLIMT data module are as follows:

- 12-10/100 BASE-T interface ports
- 2-10/100/1000 BASE-TX interface ports
- One Serial Console port (available to P12)

Front View

The front view of the GPLIMT data module is shown in the figure below:

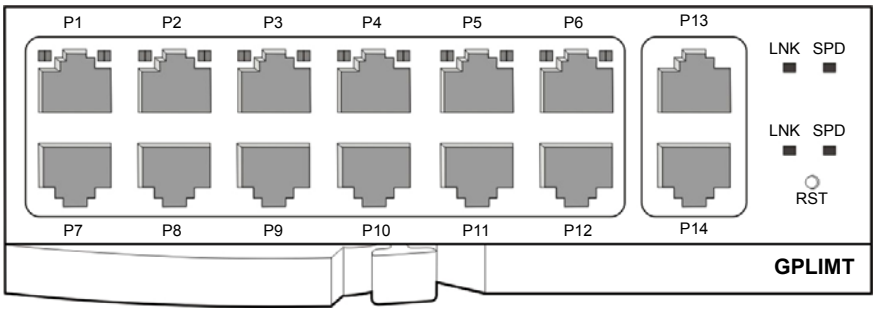

Figure 2.23 Front View of GPLIMT

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The components on the front panel of GPLIMT functions as follows:

Table 2.23 Ports and LEDs of GPLIMT

Ports, LED	Function Description
P1~P12	Ports for connecting to 10/100BASE-T Ethernet
P13, P14	Ports for connecting to 10/100/1000 BASE-TX Gigabit Ethernet (GbE)
Left LEDs of P1~P6	First LED: Link operation of P1~P6 - On: LED turns green when a link is in operation - Blink: Each port blinks on active status Second LED: 10/100 BASE-T operation of P1~P6 - Off: Operated in 10 BASE-T - On: Operated in 100 BASE-TX
Right LEDs of P1~P6	First LED: Link operation of P7~P12 - On: LED turns green when a link is in operation - Blink: Each port blinks on active status Second LED: 10/100 BASE-T operation of P7~P12 - Off: Operated in 10 BASE-T - On: Operated in 100 BASE-TX
LNK LED	LED turns on when P13~P14, which are Giga ports, is connected Blinking when the relevant port is active.
SPD LED	10/100/1000 BASE-T operation of P13~P14, which are Giga ports. - Off: Operating in 10 BASE-T - On: Operating in 100 BASE-TX - Blinking: Operating in 1000 BASE-TX
RST	Button for resetting GPLIMT

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2.3.4.5 GSIM

Gigabit Switch Interface Module (GSIM) provides Gigabit LAN interfaces of layer 2 and layer 3 to support data network.

Main Functions

The main functions of the GSIM data module are as follows:

- L3 Unicasting Protocol
- L3 Multicasting Protocol
- Ethernet Switch (802.3 compatible)
- 1000 BASE-SX/LX/TX port
- Packet Priority Control (802.1p)
- VLAN Networking (802.1q)
- Spanning Tree Protocol (RSTP, PVST+)
- Diffserv
- Flow Control (802.3x)
- Multi-casting (IGMPv1/v2, DVMRP, PIM-SM)

Specifications

The specifications of the GSIM data module are as follows:

- 1000 BASE-SX/LX/TX interface ports

Front View

The front view of the GSIM data module is shown in the figure below:

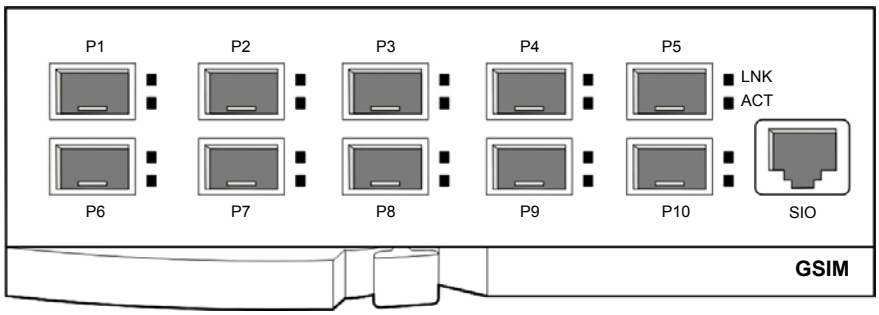

Figure 2.24 Front View of GSIM

The components on the front panel of GSIM are as follows:

Table 2.24 Ports and LEDs of GSIM

Port, LED	Function Description
P1~P10	Port for connecting to 1000 BASE-SX/LX/TX GbE (Gigabit Ethernet)
SIO	Port for connecting RS-232
LNK LED	LED turns on when P1~P10 links are connected
ACT LED	LED blinks when P1~P10 are on active status

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2.3.4.6 GSIMT

Gigabit Switch Interface Module TX (GSIMT) provides Gigabit LAN interfaces of layer 2 and layer 3 to support data network.

Main Functions

The main functions of the GSIM data module are as follows:

- L3 Unicasting Protocol
- L3 Multicasting Protocol
- Ethernet Switch (802.3 compatible)
- 10/100/1000 BASE-TX port
- Packet Priority Control (802.1p)
- VLAN Networking (802.1q)
- Spanning Tree Protocol (RSTP, PVST+)
- Diffserv
- Flow Control (802.3x)
- Multi-casting (IGMPv1/v2, DVMRP, PIM-SM)

Specifications

The specifications of the GSIMT data module are as follows:

- 10/100/1000 BASE-TX interface ports

Front View

The front view of the GSIMT data module is shown in the figure below:

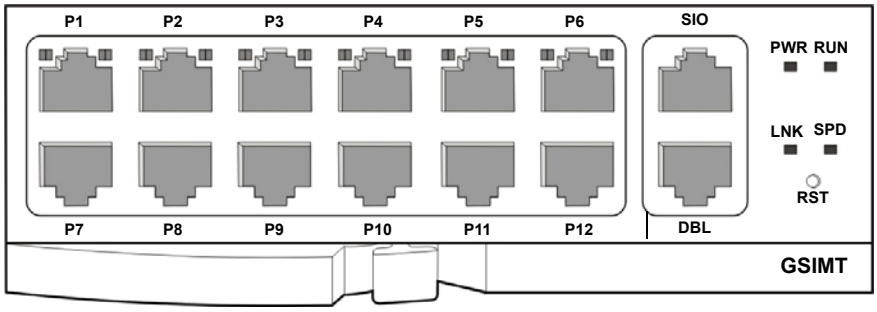

Figure 2.25 Front View of GSIMT

The components on the front panel of GSIMT are as follows:

Table 2.25 Ports and LEDs of GSIMT

Port, LED	Function Description
P1~P12	Port for connecting to 10/100/1000 BASE-TX GbE (Gigabit Ethernet)
SIO	Port for connecting RS-232
DBL	LAN port for debug
Left LED of P1~P6	10/100/1000 BASE-TX operation of P1~P6 - Switching orange and green LEDs: Operating in 10 BASE-T - Green LED: Operating in 100 BASE-TX (blinking in active mode) - Orange LED: Operating in 1000 BASE-TX (blinking in active mode)
Right LED of P1~P6	10/100/1000 BASE-TX operation of P7~P12 - Switching orange and green LEDs: Operating in 10 BASE-T - Green LED: Operating in 100 BASE-TX (blinking in active mode) - Orange LED: Operating in 1000 BASE-TX (blinking in active mode)
PWR LED	Power supplying mode - Power-on: Normal power supply
RUN LED	GSIMT operation mode - Blinking: RAM program is running
LNK LED	LED turns on in the connection of DBL port link
SPD LED	10/100BASE-T Ethernet operation of DBL port - Off: Operating in 10 BASE-T - On: Operating in 100 BASE-TX (blinking in active mode)
RST	Button for resetting GSIMT

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2.3.4.7 GWIMT

Gigabit WAN Interface Module TX (GWIMT) provides WAN interfaces to support data network to the keyphone system. GWIMT provides a leased line for data communication between the keyphone system and the Internet, supports for connecting, xDSL/cable modem interface, and performs functions for VPN, QoS and Firewall. For the leased line ports, there are a port, which is available to connect up to E1 speed, and a port, which is available to connect up to T3/E3 (50 Mbps). In addition, there is an additional DMZ port that makes firewall construction easy.

Main Functions

The main functions of the GWIMT data module are as follows:

- Routing between WAN and LAN
- Supporting Multi WAN ports (Leased line, xDSL/cable modem interface)
- Functions for VPN, QoS and Firewall
- Providing various external interfaces for data transmission/reception with the external Internet.
- Providing ports for connecting with the internal network
- Leased line interface using V.35/HSSI
- Functioning as 10/100/1000 BASE-TX Ethernet port interworking with xDSL or cable modem
- Functioning as 10/100/1000 BASE-TX for Ethernet LAN interfaces
- Providing UART ports for configuration setting
- Functioning as various applications such as firewall and VPN

The Gigabit WAN Interface Module TX (GWIMT) provides a WAN interface to support a data network on the key phone system. The GWIMT supports a leased line and xDSL/cable modem interface connectivity and performs the VPN, QoS, and firewall functions for data communication between the key phone system and the Internet. The leased line provides two ports, one supporting up to E1 speed and the other supporting up to T3/E3 speed (50 Mbps).

Main Functions

- IPv4/IPv6 routing between the WAN and LAN
- IPv6 over IPv4 tunneling
- Virtual Router Redundancy Protocol (VRRP)
- GRE tunneling (generic routing encapsulation)
- Supporting multi WAN ports (Leased line, xDSL/cable modem interface)
- VPN, QoS, and firewall functions
- IPSec NAT-traversal and VPN pass-through functions

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- Interoperation with the leased line using V.35 and HSSI
- 1000 BASE-TX/SX/LX Ethernet function for LAN interface
- Providing a UART port for configuration activities
- Various applications including DHCP, NTP, and IDS/IPS

Specifications

The specifications of the GWIMT data module are as follows:

- 10/100/1000 BASE-TX ports
- One T1/E1 (V.35) port
- One T3/E3 (HSSI) port
- One serial console port

Front View

The front view of the GWIMT data module is shown in the figure below:

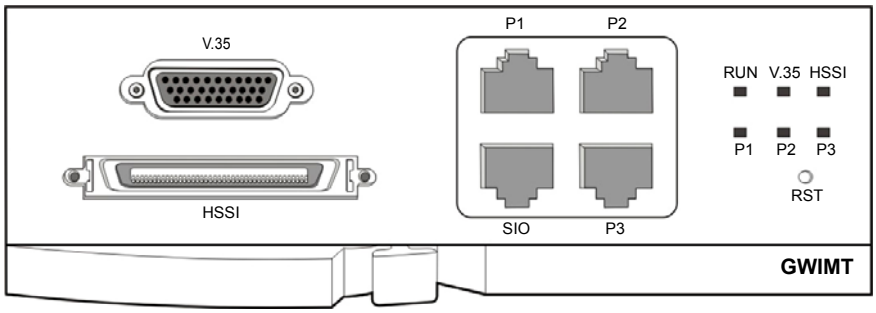

Figure 2.27 Front View of GWIMT

The components on the front panel of GWIMT are as follows:

Table 2.27 Ports and LEDs of GWIMT

Port, LED	Function Description
P1~P3	Ports for connecting to 10/100/1000 BASE-TX Gigabit Ethernet
V.35	Ports for connecting to T1/E1 links
HSSI	Ports for connecting to T3/E3 links
SIO	Ports for connecting RS-232
RUN LED	The status of the GWIMT - Off: No power supplied or the operation in abnormal status - LED turns Green: Normal status
V.35 LED	LED turns on when T1/E1 link is connected normally
HSSI LED	LED turns on when T3/E3 link is connected normally
P1~P3 LED	LED turns on when the relevant links are connected normally
RST	Button for resetting the GWIMT

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2.3.5 Voice Application Module

This section describes the interface module that uses Digital Adaptor for Subscriber Loop (DASL) to send/receive voice to/from the phone system and wireless base station as well as the module that converts voice to data and then, sends/receives the data.

2.3.5.1 MGI64/MGI16

MGI64/MGI16 is a module that transmits and receives voice via data network after converting into data. Up to 64 channels and 16 channels are provided for MGI64 and MGI16, respectively. In addition, MGI64 and MGI16 decompress voices of G.729, G.723, G.726 and G.711. The MGI64/MGI16 provides the VoIP functions to serve as both of a client and server. The MGI64/MGI16 board converts voice to data and sends/receives the data via the data network. Up to 64 channels and 16 channels are provided for MGI64 and MGI16, respectively. In addition, MGI64 and MGI16 decompress voices of G.729, G.723, G.726 and G.711. It also provides a T.38 specification compliant Fax function.

Main Functions

The main functions of the MGI64/MGI16 voice application module are as follows:

- Voice decompression: G.729, G.723, G.726, G.711
- Facsimile relay: One channel per 4 channels
- Echo cancellation
- Volume adjustment (-30~+30 dBm)
- Silence suppression

Front View

The front view of the MGI64 voice application module is shown in the figure below:

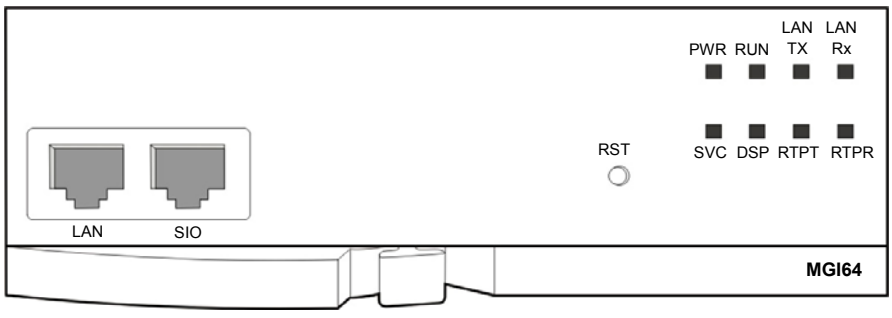

Figure 2.30 Front View of MGI64

The front view of the MGI16 voice application module is shown in the figure below:

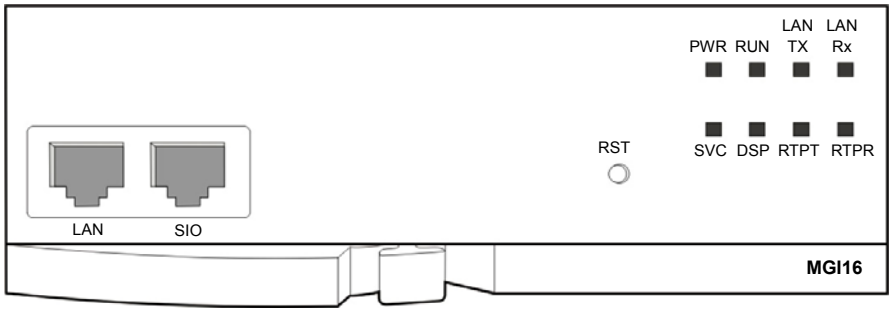

Figure 2.31 Front View of MGI16

The components on the front panel of MGI64/MGI16 are as follows:

Table 2.30 Ports and LEDs of MGI64/MGI16

Port, LED	Function Description
LAN	Port for connecting to Ethernet
SIO	UART port (for tests)
RST	Button for resetting MGI module
PWR LED	Power supply - Off: Power supply blocked - On: Power supplied
RUN LED	MGI64/MGI16 status - Off: Power supply blocked - On: On booting - Blink: RAM program in operation
LAN Tx LED	Ethernet Data Transmission - Off: No data - On or Blink: Data are being transmitted
LAN Rx LED	Links and Ethernet Data Reception - Off: No data or no link connected - On or blink: On data reception
SVC LED	Service - LED blinks when the task service of the software is available
DSP LED	VoIP DSP operation - LED blinks when VoIP DSP is operated
RTPT LED	Voice packet transmission - LED turns on when transmitting voice packets
RTPR LED	Voice packet reception - LED turns on when receiving voice packets

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2.3.5.2 OAS (OfficeServ Application Server)

The OAS converts the voice into data and transmits the data through the data network. It supports a maximum of 32 channels and provides the G.729, G.723, G.711 voice compression/decompression function. It also provides a T.38 specification compliant Fax function. OAS can be mounted on slots 1, 2, 3, 4, and 5 of the basic and expansion cabinet. If the OAS board is mounted on one of the slot 1 and 2, no board can be mounted on the other slot. If any board is mounted on the other slot, the board will not work.

Major Functions

The major functions of the OAS are as follows:

- Voice decompression (Codec): G.729, G.723, and G.711
- Fax Relay Function: Providing 1 FAX channel according to Voice 1 channel
- Echo cancellation: Dual Filter EC (Enhanced EC)
- Volume adjustment (-14~+6 dBm)
- Silence suppression
- DTMF receiver functions with channel numbers such as 32, 28, 24 or 16 for MOBEX Executive user.
- MPS (Media Proxy Service) redirects the RTP data for the call between IP Phone of Private IP Network and that of Public IP Network.

Front View of OAS

The front view of the OAS is shown in the figure below:

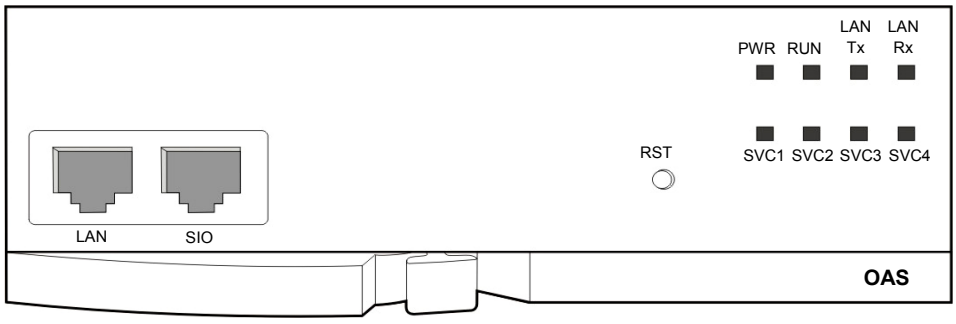

Figure 2.32 Front View of the OAS

The components on the front panel of the OAS have the functions below:

Table 2.35 Ports and LEDs of the OAS

Ports, LEDs	Functions
LAN	Port that connects the Ethernet.
SIO	UART port (for tests).
RST	Button for resetting the OAS.
PWR LED	This LED indicates the power supply status. - Off: Power is not being supplied. - On: Power is being supplied properly.
RUN LED	This LED indicates OAS status. - Off: Power is not being supplied. - On: Booting. - Blink: The RAM program is operating.
LAN Tx LED	This LED indicates the status of the Ethernet data transmission. - Off: Data does not exist. - On or blink: Data is being transmitted.
LAN Rx LED	This LED indicates the reception status of the link and Ethernet data. - Off: Data does not exist or the link is not connected. - On or blink: Data is being received.
SVC1 LED	This LED indicates if the MGI service is being offered. - This LED turns on when the MGI software task can be serviced.
SVC2 LED	This LED indicates if the MFR service is being offered. - This LED turns on when the MFR software task can be serviced.
SVC3 LED	This LED indicates if the MPS service is being offered. - This LED turns on when the MPS software task can be serviced.
SVC4 LED	This LED indicates if the LINK is connected to MP. - This LED turns on when the LINK is connected to MP.

Mounting the OAS in 16 channels slot

If the OAS is mounted on one of 16 channels slot, no board can be mounted on the other slot. If any board is mounted on the other slot, the board will not work. (If the slot 1 is occupied with the OAS, the slot 2 should be empty. And if the slot 2 is occupied with the OAS, the slot 1 should be empty.

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2.3.5.3 CNF24 (24 channel Conference bridge card)

CNF24 provides transceiver function of packet data converted from voice data through the packet network. The extension participants who are connected in the system and the external participants who are connected using PSTN or SPnet can participate to the voice conference.
CNF24 provides a maximum of 24 lines for voice conference, and the conference group participants in a single conference can be from 2 to 24.
The maximum recording capacity per CNF24 is 50 hours, with a maximum of 6 concurrent recording channels.

Major Functions

Functions of CNF24 are as follows.

- Supports Meet-Me conference which the participant makes a phone call to the system to attend the conference
- Supports Pre-defined conference which the chairperson makes phone calls for a specific group at once to invite members to the conference
- Supports Ad-hoc conference which the chairperson makes a phone call for each member to invite members to the conference
- Permits a participant to enter the conference after notifying members in the conference
- Provides the chairperson with additional functions for the conference using personal web page function
- Register and setup function for guidance and greetings for the conference

System Capacity

OfficeServ 7200 provides voice conference with maximally 16 members when the CNF24 is mounted on 16 channel slot.
The number of the CNF24 is restricted as follows.

System	Maximum number of CNF24	Maximum number of members
OS7400 (MP40)	4	24 members, 4 groups (without using recording function)

Front View of CNF24

The front view of the CNF24 is shown in the figure below:

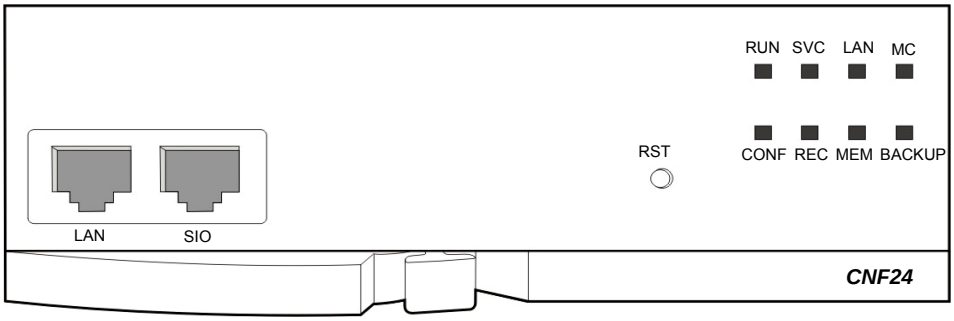

Figure 2.33 Front View of the CNF24

The components on the front panel of the CNF24 have the functions below:

Table 2.36 Ports and LEDs of the CNF24

Ports, LEDs	Functions
LAN	Port that connects the Ethernet.
SIO	UART port (for tests).
RST	Button for resetting the CNF24.
RUN LED	This LED indicates CNF24 status. - Off: Power is not being supplied. - On: Booting. - Blink: The RAM program is operating.
SVC LED	This LED indicates if the CNF24 service is being offered. - This LED turns on when the CNF24 software task can be serviced.
LAN LED	This LED indicates the status of the Ethernet link - Red: Linked as 10 BASE-T Ethernet mode - Red blink: Transmitting/receiving data as 10 BASE-T - Green: Linked as 100 BASE-TX Ethernet mode - Green blink: Transmitting/receiving data as 100 BASE-T - Orange: Linked as 1000 BASE-TX Ethernet mode - Orange blink: Transmitting/receiving data as 1000 BASE-TX - Off: Link off
MC LED	
CONF LED	This LED indicates the number of the conference channel - Green: 1 ~ 8 channels conferencing - Orange: 9 ~ 16 channels conferencing - Red: 17 ~ 24 channels conferencing - Off: No conference

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Table 2.36 Ports and LEDs of the CNF24 (Continued)

Ports, LEDs	Functions
REC LED	This LED indicates the number of the recording channel - Green: 1 ~ 2 channels conferencing - Orange: 3 ~ 4 channels conferencing - Red: 5 ~ 6 channels conferencing - Off: No recording
MEM LED	This LED indicates the capacity status of the recording storage. - Green: Uses 0 ~ 49% of the recording storage - Orange: Uses 50 ~ 69% of the recording storage. - Red: Uses 70 ~ 79% of the recording storage - Red blink: Uses over 80% of the recording storage.
BACKUP LED	This LED indicates the status of backup operation. - Green blink: Makes backup of the recorded data to the web page.

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2.3.6 SVMi-20E

Samsung Voice Mail integrated (SVMi)-20E is a Voice Mailing System (VMS) that has its own voice mailbox and auto attendant. SVMi-20E provides all voice mailbox functions required by subscribers and it is easy to use and install.
The details for SVMi-20E, see 'SVMi-20E User's Manual'.

Main Functions

The main functions of the SVMi-20E module are as follows:

- It is available to use auto attendant and voice mailbox separately or simultaneously.
- Basically, 4 calls can be processed simultaneously. If upgraded, up to 12 calls can be processed at once.
- As SVMi-20E is designed in modular type, voice ports can be added easily if necessary.
- In the OfficeServ 7400 system, only one SVMi-20E can be installed and other voice mail systems cannot connect to SVMi-20E.
- When a subscriber leaves a voice message (.wav) or fax message (.tiff), E-Mail Gateway delivers that message to user's e-mail inbox.

Specifications

The specifications of SVMi-20E are as follows:

- Maximum ports: 4~12 (Default: 4)
- Maximum subscribers: unlimited (Default: 30000)
- Message Holding Period: 0-9999 days (Default: 9999)
- Total Messages per Mail Box: 0-9999 (Default: 9999)
- Maximum Message Length: 0-9999 seconds (Default: 600)

Front View

The front view of the SBC module, which is the main module of SVMi-20E is shown in the figure below:

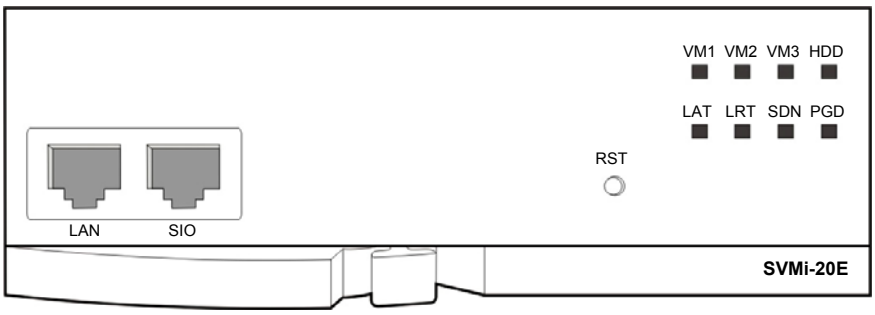

Figure 2.32 Main Module of SVMi-20E

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The components on the front panel of the main module of SVMi-20E have the functions Below:

Table 2.31 Main Module of SVMi-20E

Port, LED	Function Description
LAN	The LAN interface connector is used for data transmission and database backup. It is also called LAN connector and mainly used for system file transmission (backup and restoration). SVMi-20E backup or restore the data by using LAN provided by the customer or connecting to lap top computer or PC connected to this LAN connector directly.
SIO	Used for connecting to PC.
RST	If pressing this button, the SVMi-20E system restarts and calls in process are disconnected.
VM1 LED	LED blinks when one or more ports are hooked on/off from among the initial 4 ports (1~4).
VM2 LED	LED blinks when one or more ports are hooked on/off from among the second 4 ports (5~8).
VM3 LED	LED blinks when one or more ports are hooked on/off from among the last 4 ports (9~12).
HDD LED	LED blinks whenever contacting to hard disk driver.
LAT LED	LED turns green when LAN port is operated.
LRT LED	LED turns orange when transmitting data to LAN.
SDN LED	Indicating the system status. LED turns red when the system driver is loaded and turns green when loading is terminated.
PGD LED	LED turns green when the system power supply is normal.

NOTE

SVMi-20E

For VPM and memories of SVMi-20E, see ‘SVMi-20E User’s Manual’.

2.4 Station Phones

This section describes the types and features of analogue/digital station phones that can be connected to the OfficeServ 7400 system.

2.4.1 Regular Phones

The regular phones used for voice calls are connected to the ports of the 8SLI2/16SLI2/8COMBO2/16MWSLI module mounted on the Universal slot of the OfficeServ 7400 system.

2.4.2 Digital Phones

Digital phone are used for voice calls or data transmission and connected to the ports of the 8DLI/16DLI2/8COMBO2 module mounted on the Universal slot of the OfficeServ 7400 system. The digital phones can be used by connecting with devices such as Add On Module (AOM), Keyset Daughter Board (KDB)-D, and KDB-S.

The 5000 Series Digital Keysets are as follows:

14-Button 2-Line LCD Keyset (DS-5014D)

- 48-character display (2×24) LCD with 3 associated soft keys and scroll key
- 14 programmable keys
- Navigation keys for easy use of keyset functions
- 5 fixed-function keys
- Built-in speakerphone
- Keyset Status Indicator
- 8 selectable ring tones
- Volume Up/Down keys for digital control of speaker, handset and ringer volumes
- Desk- or wall-mounted

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21-Button 2-Line LCD Keyset (DS-5021D)

- 48-character display (2×24) LCD with 3 associated soft keys and scroll key
- 21 programmable keys
- Navigation keys for easy use of keyset functions
- 5 fixed-function keys
- Built-in speakerphone
- Keyset Status Indicator
- 8 selectable ring tones
- Volume Up/Down keys for digital control of speaker, handset and ringer volumes
- Desk-or wall-mounted

7-Button 2-Line LCD Keyset (DS-5007S)

- 48-character display (2×24) LCD with 3 associated soft keys and scroll key
- 7 programmable keys
- 5 fixed-function keys
- Built-in speakerphone
- Keyset Status Indicator
- 8 selectable ring tones
- Volume Up/Down keys for digital control of speaker, handset and ringer volumes
- Desk- or wall-mounted

14-Button 2-Line LCD Keyset (DS-5014S)

- 48-character display (2×24) LCD with 3 associated soft keys and scroll key
- 14 programmable keys
- 5 fixed-function keys
- Built-in speakerphone
- Keyset Status Indicator
- 8 selectable ring tones
- Volume Up/Down keys for digital control of speaker, handset and ringer volumes
- Desk or wall-mounted

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38-Button 2-Line LCD Keyset (DS-5038S)

- 48-character display (2×24) LCD with 3 associated soft keys and scroll key
- 38 programmable keys
- 5 fixed-function keys
- Built-in speakerphone
- Keyset Status Indicator
- 8 selectable ring tones
- Volume Up/Down keys for digital control of speaker, handset and ringer volumes
- Desk- or wall-mounted

12-Button Large LCD Keyset (DS-5012L)

- Large LCD with 12 keys for feature selection
- Supports data transfer, handset calls and full-duplex speakerphone
- USB interface
- Navigation keys for easy use of keyset functions
- 5 fixed-function keys
- Keyset Status Indicator
- 8 selectable ring tones
- Volume Up/Down keys for digital control of speaker, handset and ringer volumes

NOTE

Up to 8-DS-5012L phones can be connected with the DLI module (8DLI).
24 DS-5012L phones can be connected to both the basic chassis and expansion chassis (48 totals).

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2.4.3 IP Phones

Internet (IP) phones use IP addresses to send/receive voice and data. They use existing data network lines, so do not need normal phone lines, and can be connected to devices such as a switching hub. They are connected to other digital phones through the MGI16 or OAS module.

The 5200 Series IP Keysets are as follows:

Large Colour LCD UC IP Keyset (SMT-i5234)

- 4.3” colour LCD with 5 keys for feature selection
- Supports data and voice transfer using Internet Protocol
- 14 programmable keys with LED
- Navigation keys for easy use of functions
- 11fixed-function keys
- Built-in speakerphone
- Keyset Status Indicator
- Polyphonic ring tones
- Volume Up/Down keys for digital control of speaker, handset and ringer volumes
- Desk or wall mount

Dual LCD IP Keyset (SMT-i5230)

- 3.2” LCD with 4 context sensitive keys
- Supports data and voice transfer using Internet Protocol
- 7 programmable keys with LCD tag
- Navigation keys for easy use of functions
- 11 fixed-function keys
- Built-in speakerphone
- Keyset Status Indicator
- Polyphonic ring tones
- Volume Up/Down keys for digital control of speaker, handset and ringer volumes
- Desk- or wall-mounted

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24-Button LCD IP Keyset (SMT-i5220)

- 3.2” LCD with 4 context sensitive keys
- Supports data and voice transfer using Internet Protocol
- 24 programmable keys with LED
- Navigation keys for easy use of functions
- 11 fixed-function keys
- Built-in speakerphone
- Keyset Status Indicator
- 5 ring tones
- Volume Up/Down keys for digital control of speaker, handset and ringer volumes
- Desk- or wall-mounted

14-Button LCD IP Keyset (SMT-i5210)

- 2.8” LCD with 3 context sensitive keys
- Supports data and voice transfer using Internet Protocol
- 14 programmable keys with LED
- Navigation keys for easy use of functions
- 11 fixed-function keys
- Built-in speakerphone
- Keyset Status Indicator
- 5 ring tones
- Volume Up/Down keys for digital control of speaker, handset and ringer volumes
- Desk- or wall-mounted

64-Button IP AOM

- 64 programmable keys with LEDs
- Up to 4 can be assigned to a terminal to provide additional programmable keys
- Mechanical connection to 5200 series handsets

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The 3100 Series IP Keysets are as follows:

5-Button LCD IP Keyset (SMT-i3105)

- 2.8” LCD with 3 context sensitive keys
- Supports data and voice transfer using Internet Protocol
- 5 programmable keys with LED
- 10 fixed-function keys
- Built-in speakerphone
- Keyset Status Indicator
- 5 ring tones
- Volume Up/Down keys for digital control of speaker, handset and ringer volumes
- Desk- or wall-mounted

5-Button LCD IP Keyset (SMT-i3100)

- 2.8” LCD with 3 context sensitive keys
- Supports data and voice transfer using Internet Protocol
- 5 programmable keys
- 10 fixed-function keys
- Built-in speakerphone
- Keyset Status Indicator
- 5 ring tones
- Volume Up/Down keys for digital control of speaker, handset and ringer volumes
- Desk- or wall-mounted

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2.4.4 Add-On Module (AOM)

DS-5064B 64-Button AOM

- 64 programmable keys with red LEDs
- Up to 4 can be assigned to a keyset to provide additional programmable keys

SMT-i5264 64-Button IP AOM

- 64 programmable keys with LEDs
- Up to 4 can be assigned to a terminal to provide additional programmable keys
- Mechanical connection to 5200 series handsets

2.4.5 Keyset Daughter Board (KDB)

5000 Series Keyset Daughter Board

DS-5014D, DS-5021D and DS-5038S keysets support one of 3 different types of daughter board installed on them to enhance operation or to provide an additional local port, depending on the type of daughter board.

KDB-Digital Line Interface (KDB-D)

If your keyset is connected to a Digital Line Interface (DLI) port that supports 2B+D operation, you may install a daughter board that provides a Digital Line Interface (DLI) port for connection of a digital station device such as a keyset or 64 button add-on modules.

KDB-Single Line Interface (KDB-S)

If your keyset is connected to a Digital Line Interface (DLI) port that supports 2B+D operation, you may install a daughter board that provides a Single Line Interface (SLI) port for connection of a standard telephone device such as a cordless phone.

KDB-Full Duplex (KDB-F)

The standard speakerphone mode of operation for 2-line LCD keysets is ‘half duplex’. This means that you cannot transmit and receive speech at the same time. Adding a KDB-F to your keyset will convert the speakerphone into full duplex mode, enhancing its operation. In addition, the KDB-F may have up to 3 external microphones attached to it for conference room type applications. These microphones require an ‘EXTMIC’ key programmed on the keyset to activate or deactivate them.

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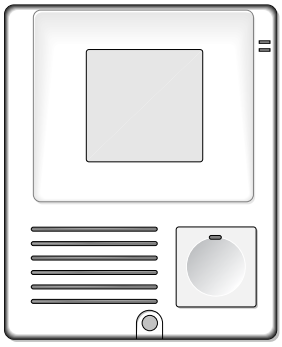
2.4.6 Door Phone and Door Phone Interface Module (DPIM)

The DPIM adapts any DLI circuit for use with the door phone unit. The unit is commonly used to request entry through locked doors (interior or exterior) or as a room monitoring box. It provides contact control to be used with a customer-provided electric door lock. The door phone is wall-mounted. An external weather-resistant unit is also available.

DPIM



Door Phone

Figure 2.33 DPLIM and Door Phone

2.5 Wireless LAN Device

This section describes the wireless LAN BTS and mobile stations that can be connected with the OfficeServ 7400 system.

2.5.1 Wireless LAN Access Point (SMT-R2000)

The wireless LAN access point SMT-R2000 is composed of a wired processing section and a wireless processing section. The wireless processing section has an IEEE 802.11a/b/g standard and wireless LAN RF interface with the wireless frequency band of 2.4 GHz and IEEE 802.11a standard and wireless LAN RF interface with the wireless frequency band of 5 GHz.

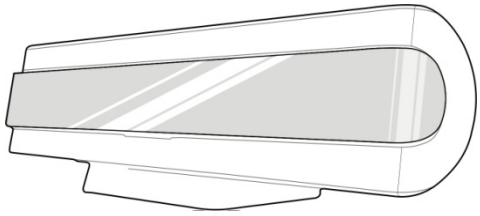


Figure 2.34 SMT-R2000

The wired Ethernet interface is connected with the LAN based on 10/100 BASE-T and transmits/receives data such as voice and Internet access. The wireless processing section transmits/receives voice data for wireless voice calls and accesses the wireless Internet.

2.5.2 Mobile Phone

The SMT-W5100 (Wireless IP-Phone Mobile type), which is a local wireless mobile station, uses the wireless LAN of IEEE802.11/g to allow the users to make voice calls. It provides the wireless IP phone functionality by compressing and transmitting/receiving the voice data using a packet format (Voice over WLAN) which satisfies the wireless LAN specification. The SMT-W5100 supports hand-over when moving between the APs (SMT-R2000) and can use data terminals such as laptops that enable the wireless LAN in the same place. It performs the message service functions supported by the OfficeServ 7200 system as well.

Figure 2.35 SMT-W5100

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2.6 Additional Devices

This section describes the types and features of devices that can be connected optionally when the OfficeServ 7400 is installed.

2.6.1 On Hold/Background Sound Source

The OfficeServ 7400 is connected with cassettes or radios in addition to the basic tone provided by the system or internal sound source to allow subscribers to listen to melodies other than ones specified to the subscribers. The devices such as the cassettes or radios are called on hold/background sound source.
The on hold/background sound source is mainly used for on hold tone, background music, or announcement and can be used by being connected with the external sound source devices below:

- FM radio
- CD player
- Cassette tape recorder

2.6.2 External Units

The OfficeServ 7400 is connected with external units such as amplifiers or speakers for consumers instead of internal speakers. The external units are connected via the MISC1 port of the MIS module, which is an optional module that can be mounted on the control module.

2.6.3 Loud Bell

The Loud Bell allows the users to listen to ring signals from outside, and amplifiers or external speakers are used for the Loud Bell.
The Loud Bell is connected via the MISC1 port of the MIS module, which is an optional module that can be mounted on the control module. Once the secondary call device is connected, a call signal rings from only a specific phone set to MMC 205 Assign Pair Station of Loud Bell.

2.6.4 Common Bell

The Common Bell is a ring that can be specified when a station group is set. Once a station in a group rings, other stations in the group ring. The Common Bell is connected via the MISC1 port of the MIS module, which is an optional module that can be mounted on the control module.

2.6.5 OSM

The OfficeServ Manager (OSM) is software for maintaining the OfficeServ 7400.
The functions for controlling the system database are implemented in the form of menus in the OSM; thus, the OSM is convenient to use when the system data are displayed or changed. Also, the users can understand and use the system operational commands easily because the commands for maintenance are unified.

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2.6.6 Installation Tool

The Installation Tool is the OfficeServ 7400 maintenance software. The Installation Tool includes a series of system database control menus for convenient viewing/modification of the system information and a package update function.

2.6.7 SMDR

The Station Message Detail Recording (SMDR) manages entire calling data such as calls between station subscribers connected with the OfficeServ 7400 as well as local/long distance/international calls. The OfficeServ 7400 provides calling data. Connect the SMDR printer or SMDR computer with the OfficeServ 7400 to use the SMDR data provided by the OfficeServ 7400 system.

- The SMDR printer can display call history received from the OfficeServ 7400, however does not display data other than the call history (i.e., toll data).
- The SMDR computer displays call history received from the OfficeServ 7400 and calculates toll using the SMDR software based on the call history. Accordingly, the SMDR computer allows the users to use data more efficiently than the SMDR printer.

2.6.8 CTI

The Computer Telephony Integration (CTI) is the integrated system of computer and telephony. That is, the CTI interworks computers with PBXs so that the computers make use of the PBXs as computer resources and the PBXs share the computer resources.
The CTI provides the operator with convenience and reduced costs and the customers with enhanced services and reduced call processing time.

Particularly, the CTI call center system configures data on the customers into databases. Based on the databases, the call center can consult with the customers one to one.
The CTI integrates communication, computers, and database based on phones as a basic medium to allow the users to perform marketing using computers such as customer-focused telemarketing.

The OfficeServ 7400 supports the standard Telephony Application Programming Interface (TAPI), which is implemented in a client/server environment and controls third party calls.

2.6.9 NMS

The Network Management System (NMS) is the OfficeServ 7400 administrator software. The NMS includes a series of system database control menus which conveniently assist the administrator to view or modify the necessary system information.
Furthermore, it manages the OfficeServ 7400 system in a single Network Element (NE), assisting the administrator to easily manage multiple systems.

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CHAPTER 3. Specification of OfficeServ 7400

This chapter describes the capacity of the OfficeServ 7400, various signal specification, power specification, rings and tones, compatible modules and terminals, and equipment specifications.

3.1 System Capacity

Up to 720 lines can be installed and operated in the OfficeServ 7400 system, and the line ratio of the station and trunk line can be adjusted within the capacity depending on the users' needs. Table 3.1 below shows the maximum line capacity of the OfficeServ 7400:

Table 3.1 OfficeServ 7400 Capacity

System Configuration	Maximum Line Capacity
Basic chassis	When using the E1: 240 When using the 8TRK: 80 When using the station: 160 When using the internal power of PLIM: 48 When using the VDSL: 20 When using the WLAN terminal: 128 When using the IP phone: 480 - SVMi-20E: one per 12 (20) systems - RCM2: Up to 2 per R2 (8) or CID (14) system R2 (4)/CID (6) (Both station and trunk lines are supported.) - CRM: Up to 2 per R2 (16), or CID (16) system - GWIMT: 1 - GSIM or GSIMT: 2 - GPLIMT: 10 (Use OS7150 power supplier, if necessary)

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Table 3.1 OfficeServ 7400 Capacity (Continued)

System Configuration	Maximum Line Capacity
Basic chassis + Expansion chassis1	When using the E1: 240 When using the 8TRK: 168 When using the station: 336 When using the internal power of PLIM/PLIM2: 96 When using the VDSL: 40 When using the WLAN terminal: 128 When using the IP phone: 480 - RCM2: Up to 4 per R2 (8) or CID (14) system R2 (4)/CID (6) (Both station and trunk lines are supported.) - CRM: Up to 4 per R2 (16), or CID (16) system - GWIMT: 1 - GSIM or GSIMT: 4 - GPLIMT: 21 (Use OS7150 power supplier, if necessary)
Basic chassis + Expansion chassis1 Expansion chassis2	When using the E1: 240 When using the 8TRK: 240 When using the station: 480 When using the internal power of PLIM/PLIM2: 144 When using the VDSL: 60 When using the WLAN terminal: 128 When using the IP phone: 480 - RCM2: Up to 6 per R2 (8) or CID (14) system R2 (4)/CID (6) (Both station and trunk lines are supported.) - CRM: Up to 6 per R2 (16), or CID (16) system - GWIMT: 1 - GSIM or GSIMT: 6 - GPLIMT: 32 (Use OS7150 power supplier, if necessary)

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3.1.1 Trunk Line Capacity

The maximum trunk line capacity of the OfficeServ 7400 based on its configuration is shown in the table below:

Table 3.2 Trunk Line Capacity

System Configuration	Analogue		Digital	
	LOOP TRK	T1 TRK	E1 TRK	PRI TRK
Basic chassis	80	240	240	T1: 240 E1: 240
Basic chassis + Expansion chassis1	168	240	240	T1: 240 E1: 240
Basic chassis + Expansion chassis1+Expansion chassis2	240	240	240	T1: 240 E1: 240

3.1.2 Station (Subscriber) Line Capacity

The maximum station line capacity for regular phones and digital phones in the OfficeServ 7400 based on its configuration is shown in the table below:

Table 3.3 Station Line Capacity

System Configuration	Regular Phones	Digital Phones
Basic chassis	160	160 (DS-5012L: 73)
Basic chassis + Expansion chassis1	336	336 (DS-5012L: 146)
Basic chassis + Expansion chassis1+Expansion chassis2	480	480 (DS-5012L: 219)

3.1.3 Number of Channels

The number of channels of each slot of OfficeServ 7400 and the number of CID receivers and DTMF receivers are as follows:

Table 3.4 Channels of Each Slot

Category	Slot	Number of Channels
Basic chassis	Slot 1, 2, 4, 5, 6, 7, 8, 9, 10, 11	64
Expansion chassis	Slot 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11	32
CID receiver	Based on basic chassis	14
DTMF receiver	Based on basic chassis	48

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3.2 Electrical Specification

3.2.1 Signal Specification

The signal processing protocol means the methods for connecting signals between the trunk lines, stations and system, and also means the method of providing the status information.

3.2.1.1 Signaling Type of the Trunk Line

Loop Start

In processing loop start signals, the on-hook and the off-hook statuses are controlled by the flow of electric current. The loop is a closed loop trunk circuit or a standard 2500-type set loop.

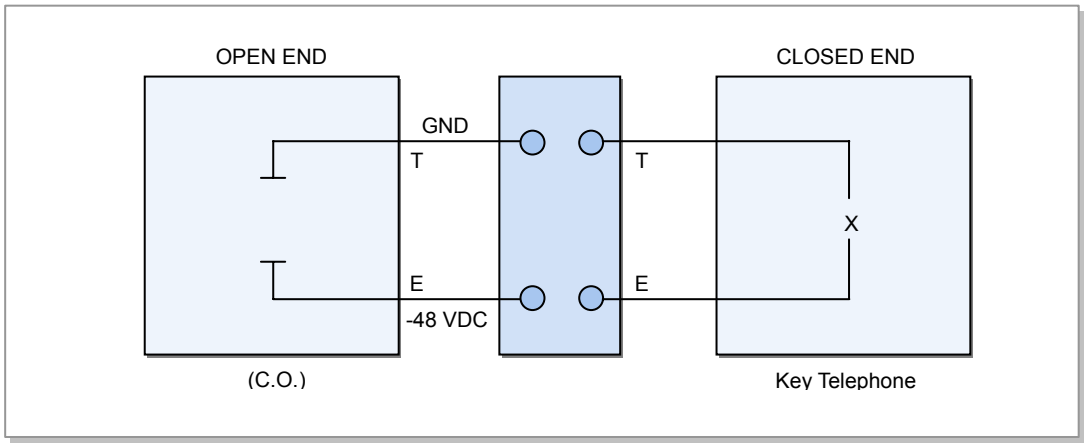

Figure 3.1 Trunk Line Loop Start Signaling

T1 Trunk Line

- The electrical characteristics of the T1 trunk line comply with the ITU G.703 and G.704 standards.

Table 3.5 Electrical Characteristics of the T1 Trunk Line

Categories		Specifications
Transmission speed		1544 kbits/s ±50 ppm
Code		AMI or B8ZS
Pulse type		Regular square wave: When indicating all valid signals, comply with the mask (G.703) regardless of the codes.
Transmission media		A pair of twisted lines
Load resistance		100 Ω
Indicated (pulse) nominal peak voltage		3.00 V
Signal Level	Power at the frequency of 772 kHz	±12~±19 dBm
	Power at the frequency of 1544 kHz	25 dB or higher when the power is less than the power at the frequency of 772 kHz

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- The signaling specification and the signaling method of the T1 trunk line should comply with the ITU G.703 and G.704 standards.

E1 Trunk Line

- The electrical characteristics of the E1 trunk line comply with the ITU G.703 and the G.704 standards.

Table 3.6 Electrical Characteristics of the E1 Trunk Line

Categories	Specifications
Transmission speed	2048 kbits/s ±50 ppm
Code	High Density Bipolar of Order 3 (HDB3)
Pulse type	Regular square wave: When indicating all valid signals, comply with the mask (G.703) regardless of the codes.
Nominal and pulse	244 ns
Jitter of the I/O terminal	Refer to the G.823
Transmission media	A pair of twisted lines
Load resistance	120 Ω
Indicated (pulse) nominal peak voltage	3.00 V
Blank (non-pulse) peak voltage	0 ±0.300 V

- The signaling specification and the signaling method of the E1 trunk line comply with the ITU G.703 and G.704 standards E1.

Characteristics of the ISDN Interface Transmission

The electrical characteristics of the ISDN (BRI) interface comply with the ITU I.430 and ETS 300 012 standards.

Table 3.7 Electrical Characteristics of the BRI Trunk Line

Categories	Specifications
Transmission speed	192 kbits/s ±100 ppm
Code	AMI
Pulse type	Regular square wave: When indicating all valid signals, comply with the mask (I.403) regardless of the codes.
Transmission media	Pair of twisted lines
Load resistance	120 Ω
Indicated (pulse) nominal peak voltage	2.75 V

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- The electrical characteristics of the ISDN (PRI) interface comply with the ITU I.431 and ETS 300 011 standards

Table 3.8 Electrical Characteristics of the PRI Trunk Line

Categories	Specifications
Transmission speed	2048 kbits/s ±50 ppm
Code	High Density Bipolar of Order 3 (HDB3)
Pulse type	Regular square wave: When indicating all valid signals, comply with the mask (I.403) regardless of the codes.
Nominal and pulse	244 ns
Transmission media	A pair of twisted lines
Load resistance	120 Ω
Indicated (pulse) nominal peak voltage	3.00 V
Blank (non-pulse) peak voltage	0 ±0.300 V

- The electrical characteristics of the Digital Line Interface (DLI) are shown in the table below:

Table 3.9 Electrical Characteristics of the DLI Line

Categories	Specifications
Transmission speed	38144 kbits/s
Code	AMI (Alternate Mark Inversion)
Pulse type	Typical AMI Waveform

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3.2.1.2. Signaling Type of the Dedicated Line

Electrical Characteristics of the GWIMT Interface

- The electrical characteristics of the V.35 interface are shown in the table below:

Table 3.10 Electrical Characteristics of the GWIMT Interface (V.35 Interface)

Categories	Specifications
Maximum transmission speed	10 Mbits/s
Transmission code	V.35 driver
Number of transmission lines	18 EA
Characteristic resistance	100 Ω
Indicated (pulse) nominal peak voltage	±2 V
Input Differential Threshold	±80 mV

- The electrical characteristics of the RS-232C (V.28) interface are shown in the table below:

Table 3.11 Electrical Characteristics of the GWIMT Interface (RS-232C Interface)

Categories	Specifications
Maximum transmission speed	230 Kbits/s
Transmission code	V.28 driver
Number of transmission lines	14 EA
Indicated (pulse) nominal peak voltage	±15 V
Input Threshold	+1.2, -1.7 V

- The electrical characteristics of the HSSI interface are shown in the table below:

Table 3.12 Electrical Characteristics of the GWIMT Interface (HSSI Interface)

Categories	Specifications
Maximum transmission speed	50 Mbits/s
Transmission code	HSSI driver
Number of transmission lines	50
Characteristic resistance	110 Ω
Indicated (pulse) nominal peak voltage	±1 V
Input Threshold	±0.15 V

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3.2.1.3. Signaling Type of the LAN

- The electrical characteristics of the 10 Base-T, which comply with the IEEE802.3 standards, are shown in the table below:

Table 3.13 Electrical Characteristics of the LAN Interface (10 Base-T)

Categories	Specifications
Transmission speed	10 Mbits/s
Transmission code	Manchester coding (When the transmission data is '0', the higher level than the middle of the bit is inversed into the lower level. When the transmission data is '1', the lower level than the middle of the bit is inversed into the higher level)
Access control method	Carrier Sense Multiple Access/Collision Detect (CSMA/CD)
Transmission media	UTP (Unshielded Twisted Pair) CAT3, CAT4, CAT5, STP (Shielded Twisted Pair)
Number of the UTP pairs	2 pairs
Characteristic resistance	100 Ω
Cable thickness	Diameter: 0.51 mm (24 AWG), External diameter: 5 mm

- The electrical characteristics of the 100 Base-Tx, which comply with the IEEE802.3u standards, are shown in the table below:

Table 3.14 Electrical Characteristics of the LAN Interface (100 Base-Tx)

Categories	Specifications
Transmission speed	100 Mbits/s
Transmission code	4B/5B+MLT-3 4 bit/5 bit converts the data of 4bit into the data of 5bit and encodes the data on the physical layer. Multi Level Transmission-3 (MLT-3) encodes transmission data into 3 levels (high, middle, and low).
Access control type	CSMA/CD
Transmission media	UTP CAT5, STP
Number of UTP pairs	2 pairs
Characteristic resistance	100 Ω
Cable thickness	Diameter: 0.51 mm (24 AWG), External diameter: 6 mm

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- The electrical characteristics of the 1000 BASE-TX, which comply with the IEEE802.3ab standards, are shown in the table below:

Table 3.15 Electrical Characteristics of LAN Interface (1000 BASE-TX)

Categories	Specifications
Transmission speed	1000 Mbits/s
Transmission code	8B1Q4 The 8-bit transmission data are converted into 9-bit transmission signals via the additional treatment of scramble, error detection bit, and then are mapped into the transmission signals of 4 teams with 5 levels, and are randomized into each pair of transmission signal to be transmitted.
Access control method	CSMA/CD
Transmission media	UTP CAT5 (Maximum transmission distance 100 m)
Number of UTP pair	4 pairs
Characteristic resistance	100 Ω
Cable thickness	Diameter 0.51 mm (24 AWG), External diameter 6 mm

- The electrical characteristics of 1000 BASE-SX/LX, which comply with the IEEE802.3z standards, are shown in the table below:

Table 3.16 Electrical Characteristics of LAN Interface (1000 BASE-FX)

Categories	Specifications
Transmission speed	1000 Mbits/s
Transmission code	8B/10B Data Encoding The 8-bit (8B) data entered from the upper layer of MAC Part are handled in one nibble to be converted into the signals of 10-bit (10B) at the physical layer. And then each nibble of the converted data are transmitted. The transmission speed after the conversion into 8B/10B is 1250 Mbps.
Access control method	CSMA/CD
Transmission media	SX: Multimode Optical Fiber (MMF) LX: Multimode Optical Fiber/Single mode Optical Fiber (SMF)
Number of Optical Fibers	2 pairs
Maximum transmission distance	SX: Maximum 550 m LX: Maximum 5 km
Cable thickness	Diameter 0.51 mm (24 AWG), External diameter 6 mm

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Table 3.17 1000 BASE-SX/LX Optical Fiber

Fiber Type	Mode Band (Short Wave/Long Wave MHz.Km)	Transmission Distance (m)	
		1000BASE-SX	1000BASE-LX
62.5uM MMF	160/500	220	550
	200/500	275	550
50uM MMF	400/400	500	550
	500/500	550	550

NOTE

Mode Band

The mode band shown in the previous table is a quality indicator of the multimode optical fiber related to the transmission speed. Its unit is generally MHz. Km, and is proportional to the value of the bit rate of the optical signal (the on-off speed) X the maximum transmission distance. The largeness of this value means the high optical signal with high bit rate can be transmitted. Each mode band is standardized also in the use of short wave and long wave laser.

NOTE

Categories of UTP Cable

UTP Cables are classified into Straight-through UTP cable and Crossover UTP cable. The Straight-through UTP cable is used for connecting the LIM module of OfficeServ 7400 system to other modules (MP40).
The Crossover UTP cable is used for connecting only LIM (PLIM) module to LIM (PLIM) module.

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3.2.1.4 Signaling Type of the Station

Dial Pulse Signaling Type

- Ratio-10 Pulse Per Second (PPS)
- Make/Break Ratio (M/B ratio)-33%: 66% (It can be adjusted by the software.)
- The minimum signaling time between digits-20 msec (It can be adjusted by the software.)

DTMF Push Button Dialing

The DTMF signal processing complies with the ITU standard, which enables the user to send/receive the signals of digital phones through the trunk line and to process the signals of regular phones.

3.2.1.5 Signaling Type of the VDSL

The electrical characteristics of the VDSL for using the long-distance Ethernet are shown in the table below:

Table 3.18 Electrical Characteristics of the VDSL Interface

Categories	Specifications
Transmission speed	1 M~16 Mbits/s
Modulation code	QAM (Quadrature Amplitude Modulation)
Error detection	Reed Solomon coding method
Transmission distance	1.0 km
Transmission media	1 pair of twisted lines
Characteristic resistance	Splitter installed
Used frequency	138 KHz~12 MHz
Link speed	Down link: 30 Mbps (300 m), Up link: 10 Mbps (300 m)

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3.2.2 Transmission Characteristics

- Attenuation
  Attenuation between subscribers: Less than 6 dB
  Attenuation between the subscriber and local trunk line: Less than 0.5 dB
- Characteristic resistance of the line: 600 Ω
- Weighted noise: Less than -65 dBm
- Crosstalk attenuation: Less than -68 dBm
- Frequency band: 300~3400 Hz
- Insulation resistance: More than 1 MΩ

3.2.3 Line Conditions

- Length for installation:
  Regular phones: Up to 1 km (When the AWG #24 cable is used)
  Digital phones: Up to 400 m (When the AWG #24 cable is used)
  Door phones: Up to 400 m (When the AWG #24 cable is used)
  AOMs: Up to 400 m (When the AWG #24 cable is used)
- Distance between PLIM and SMT-R2000: Up to 100 m (when an Ethernet cable is used)
- Leakage resistance between lines: More than 20 KΩ
- Leakage resistance between grounds: More than 20 KΩ

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3.3 Power Specification

3.3.1 OfficeServ 7400 System Power

OfficeServ 7400 operates by AC input power or battery power and supplies the system chassis with the backup power of -54 V, -5.3 V, +3.3 V, +5 V, +12 V, or -54 V (BATT).

Table 3.19 I/O Voltage of PSU

Power Supply Devices		Specifications
Power Supply Units (PSU)	Input power	AC 220 V
	Output power	- DC -54 V, 6.6 A - DC -5.3 V, 2 A - DC +3.3 V, 30 A - DC +5 V, 16 A - DC +12 V, 1 A - DC -54 V, 0.45 A (BATT, for backup)
External rectifier (Model name: OfficeServ 7150)	Input power	AC 220 V (for the local use)
	Output Power	DC -54 V, 20 A (Installed 2 Power unit)

3.3.2 External Rectifier

External Rectifier is used for the power supply to IP phone or to SMT-R2000 when PLIM is used in OfficeServ 7400 system.
The additional -54 V power is to be supplied to the external device as shown in the figure below for supplementing the insufficient internal power.

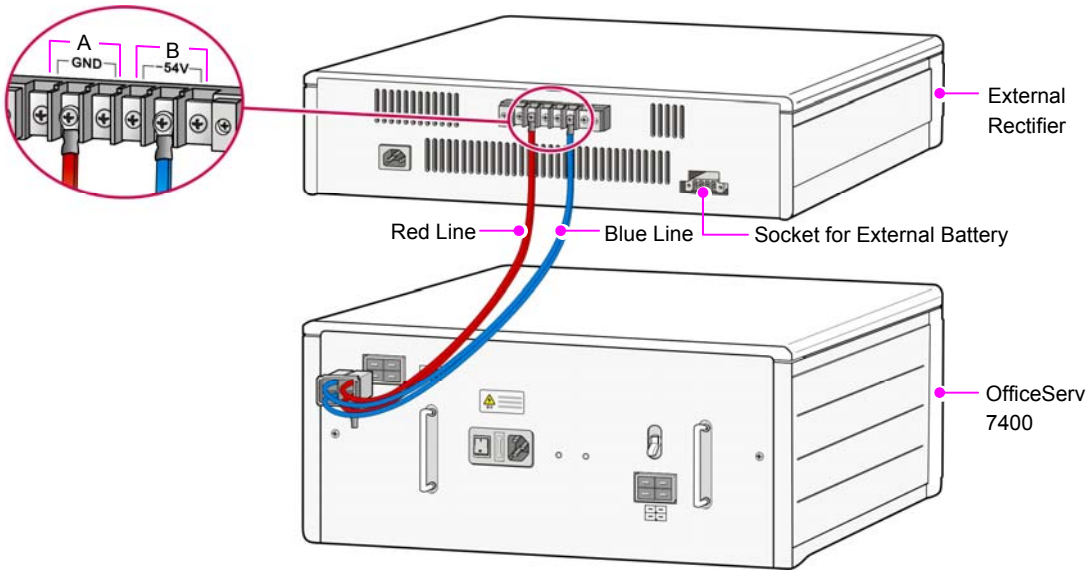

Figure 3.2 External Rectifier

NOTE

External Rectifier Installation
Refer to 'OfficeServ 7400 Installation Manual' for the description on the external rectifier installation.

3.4 Rings and Tones

3.4.1 Ring Cycles

The OfficeServ 7400 provides the trunk line rings, station rings, door rings, and alarm rings. The ON/OFF cycle of each ring is shown in the table below:

Table 3.20 Cycles of System Ring

Rings	ON/OFF Cycles
Trunk line ring	400/200/400/3000 ms
Station ring	1000/2000 ms
Door ring	400/200/400/200/400/2000 ms
Alarm ring	400/200/400/200/400/200/400/1000 ms

NOTE

Ring ON/OFF Cycle
The ON/OFF cycle can be adjusted by changing the values of the system database.

3.4.2 Tones

The output voltage and the frequency of the ring signals in the OfficeServ 7400 are as follows:

- Output voltage: 75 V
- Frequency: 20 Hz

The OfficeServ 7400 provides the users with various tones to notify the users of the status of functional operation and give feedback to the users. The ON/OFF cycles of currently specified tones are shown in the table below:

Table 3.21 Cycles of the System Tones

Tones	ON/OFF Cycles
Dial tone	1000/250 ms
Busy Tone	500/500 ms
Do Not Disturb tone	250/250 ms
Ring Back tone	1000/2000 ms
Call Park tone	Continuous

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Table 3.21 Cycles of the System Tones (Continued)

Tones	ON/OFF Cycles
Confirmation/Caution/Barge-In tone	50/50 ms
Call Back/Hold tone	500/3500 ms
Error/Number Unobtainable tone	250/250 ms
Message Camp On tone	Continuous

3.5 Available Terminals

The terminals available to the OfficeServ 7400 are shown in the table below:

Table 3.22 OfficeServ 7400 Compatible Terminals

Types	Terminals
DS-5000 series digital phones	DS-5007S, DS-5014S, DS-5014D, DS-5021D, DS-5038S, DS-5012L
ITP-5000 series IP phones	ITP-5014D, ITP-5021D, ITP-5012L, ITP-5112L, ITP-5114D, ITP-5121D, ITP-5107S
SMT-3100 series IP phone	SMT-i3100, SMT-i3105
SMT-5200 series IP phone	SMT-i5210, SMT-i5220, SMT-i5230, SMT-i5243, SMT-i5264
Wireless LAN devices (WLAN)	SMT-W5105 (Mobile Station), SMT-W5120 (mobile Station) SMT-R2000 (Access Point)
AOM	DS-5064BAOM SMT-i5264
Others	KDB-S, KDB-D, KDB-F, DPIM, door phone,

NOTE

Compatible Terminals
All terminals compatible with the Samsung OfficeServ range of systems are available to the OfficeServ 7400.

3.6 Equipment Specification

The OfficeServ 7400 consists of one basic and 2 expansion chassis as shown in the figure below:

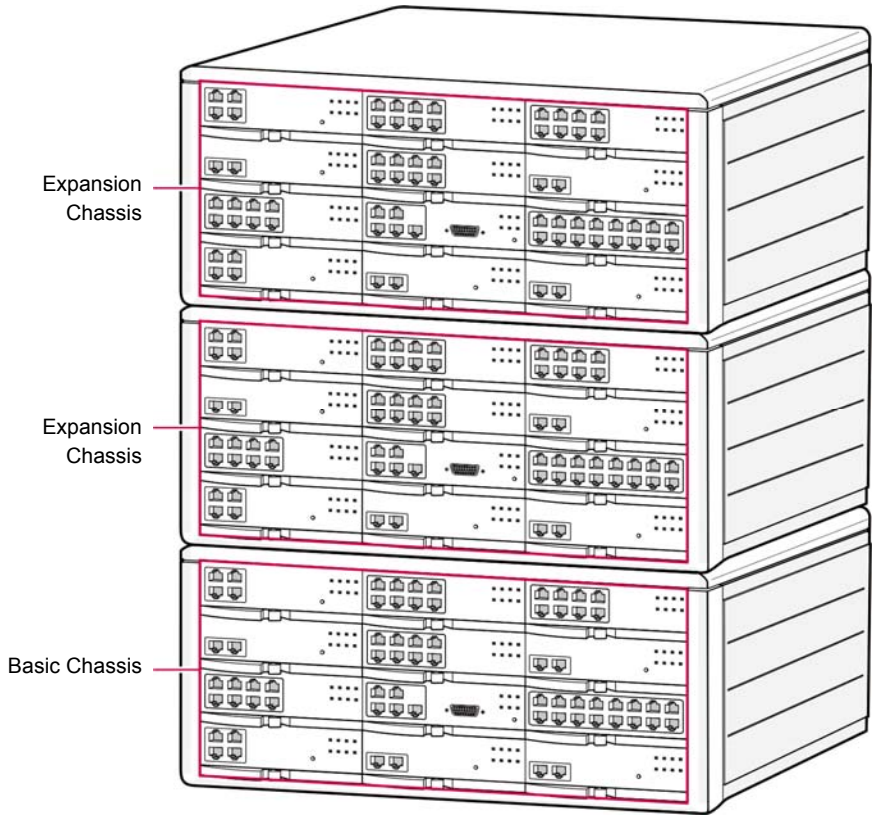

Figure 3.3 Chassis Configuration of OfficeServ 7400

- When the OfficeServ 7400 consists of one chassis (basic chassis)
  440 (W) × 223.8 (H) × 410 (D) mm
- When the OfficeServ 7400 consists of 2 chassis (basic chassis + expansion chassis)
  440 (W) × 447.6 (H) × 410 (D) mm
- When the OfficeServ 7400 consists of 3 chassis (basic chassis+2 expansion chassis)
  440 (W) × 671.4 (H) × 410 (D) mm

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3.7 Port Number Usage Detail

3.7.1 OfficeServ 7000 Series Port Number

The Port numbers used by the OfficeServ 7000 Series are represented in the next table.

Table 3.23 OfficeServ 7000 Series Port Number

Category	Service Type	Protocol	Port Number	Remarks
System	SPnet	TCP	6100	For connection setup
			1024~4999	For maintaining TCP Connection
	IP Phone interface	TCP, UDP	6000	For connection setup
		UDP	1024~4999	For signaling to IP phone
	H.323 Gateway	UDP	1719	For connection with Gatekeeper
		TCP	1720	For connection setup
			1024~4999	For maintaining TCP Connection
	SIP Gateway	UDP	5060	For connection setup
	OSM interface	TCP	5000, 5200	OSM connection
	CTI interface	TCP	5002	CTI Connection
	Program Upload		5003	Program upload to Media card
	OfficeServ News		5012	OfficeServ News Server connection
	WebMMC		5080, 5081	OfficeServ 7400 WebMMC connection
	Installation Tool		5090, 5091	OfficeServ Installation Tool connection
	7100 Web (internal)		5092, 5093	Web Server - MP/VM/Router connection
	reserved		5000~5099	Reserved for new service
	SMDR Report		5100	SMDR printout to IP connection
	UCD Report		5101	UCD printout to IP connection
	Traffic Report		5102	Traffic Report to IP connection
	Alarm Report		5103	System Alarm Report to IP connection

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Table 3.23 OfficeServ 7000 Series Port Number (Continued)

Category	Service Type	Protocol	Port Number	Remarks
System	Periodic UCD	TCP	5105	Periodic UCD printout to IP connection
	Hotel/Motel Report		5106	Hotel Report to IP connection
	BD-PMS		5107, 5109	Bi-direction PMS connection
	Centralized M&A		5110, 5210	Centralized M&A connection
	GPS Clock		5111	GPS Clock Server connection
	PIN Server		5112	PIN Code Server connection
	SMDR/ANI		5113	SMDR/ANI Server connection
	SMDR Server		5150, 5151	SMDR Server connection
	reserved		5100~5199	Reserved for new service
	QoS Monitor		8500	QoS Monitor Server connection
NMS	NMS	UDP	161	Well-known port. Can set 1024~65535
MGI	MGI16/64	RTP, RTCP	30000~30127	For stream data
		UDP	6000	For Link test with MCP
	7100 APIS (internal)	TCP	50000~50010	For CSP-MSP Signaling Interface
	OS7100 MGI	RTP, RTCP	30000~30017	For stream data
IP Phone	System Interface	UDP	6000	Signaling for MCP
		RTP, RTCP	9000, 9001	Voice data for MGI or ITP
WiFi Phone	System interface	UDP	8000, 8001	For signaling interface
			10000, 10001	For Link Indication interface
	proprietary DHCP		7000, 7001	For proprietary DHCP (Samsung)
	EasySync		6320	For PC link connection
	SIP		5060, 5080	For SIP interface
	RTP	RTP	8004, 8005	For RTP, RTCP

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3.7.2 OfficeServ Solutions Port Number

The Port numbers used by the OfficeServ Solution are represented in the next table.

Table 3.24 OfficeServ Solution Port Number

Solution	Protocol	Port Number	Remarks
IP-UMS	UDP	5025, 5026	mcplink CS-US
		5061, 5070	SIP CS-US
		14000~14511	RTP, RTCP (= RTP+1)
	TCP	8080	WebAdmin
		20001	File Server
		3681, 50000~55999	Outlook Sync Protocol
		25	Mail Alarm (SMTP)
		110, 995	Pop3, Pop3/SSL
		8624	Port Activity Monitor Program
IP-IVR	UDP	5060	SIP Port
ACD	TCP	18828	SRVPORT
		18818	CNTPORT
		18848	AGTMONISRVPORT
		54301	CTCCMDPORT
		54302	CTCEVTPORT
		17770	IODSMONIPORT
		18000	IODSALARMPORT
		17771	IODSSNDPORT
		17772	IODSRCVPORT
		17773	LOGRCVPORT
		17774	DBNETPORT
		17777	ARSLOGPORT
		17776	IODLOGRCVPORT
		17779	IODUPDATERCVPORT
		2600	ARSSNDPORT
		2601	ARSRCVPORT
		2605	VMSSNDPORT
		2700	ACSSNDPORT
		2701	ACSRECVPORT
		19000	MONIPORT
		19010	PROCMONIPORT
		8500	DBRECVPORT

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Table 3.24 OfficeServ Solution Port Number (Continued)

Solution	Protocol	Port Number	Remarks
ACD	TCP	8501	DBSENDPORT
		10018	CNTMONIPORT
		8600	HOSTPORT
		2555	ACDMANRECPORT
		30000	WallBoardPort1
		30001	WallboardPort2
		30002	WallBoardPort3
VCS	UDP	11000	For EasySync
		9000	Multicast Audio
		9230	Multicast Video
		35000	Live Push Control
		35001	GIPS listen Port
		35100	Live Push Audio
		35102	Live Push Video
		5000~6000	Internal Station
		20000~20100	External Station
		6000~7000	Internal Recording
		20100~20120	External Recording
MCS	UDP	Dynamic	SIP (System:Default 5060~n channels)
	RTP	Dynamic	Voice/Video
Easyset	TCP	5004	Easyset Web Server Listening Port (Can be changed)
7400 WebMMC	TCP	5020	WebMMC Web Server Listening Port (Can be changed)
OfficeServ Link (All ports can be changed by the option configuration.)	TCP	6000	Licensed Client Connection Port
		6001	CTI Message Monitoring Port (Self Monitoring)
		6002	SMDR & UCD Message Monitoring Port for Samsung Solution like Easyset
		6003	SMDR & UCD ports for 3rd party application
		6500	Server Solution Connection Port

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CHAPTER 4. Functions of OfficeServ 7400

This chapter describes the functions of the OfficeServ 7400 related to calls, VoIP, data and web/system management

4.1 Call Functions

The OfficeServ 7400 processes station calls, trunk line calls, application calls, or various signals through the PSTN and VoIP networking.

4.1.1 Dynamic IP Address Allocation

DHCP Client of the MP40

The MP40 is the call processing control part of the OfficeServ 7400. The MP40 uses the DHCP client function to get the IP address allocated by the data server and operate.
In this case, the data server recognizes the MP40 of the call server from the host ID of the required DHCP information and allocates the IP address specified in the DHCP allocation table. The MP40 can be operated by the fixed IP address, which is not the dynamic DHCP allocation method.

MGI64/MGI16 Configuration

The MGI mounted in the OfficeServ 7400 can be operated by receiving the dynamically allocated IP address from the data server rather than manually setting the IP address.
It can also be operated by fixed IP address.

IP Phone Configuration

The IP phones registered to the OfficeServ 7400 also can be operated by rather receiving the dynamically allocated IP address from the data server than manually setting the IP address. It can also be operated by fixed IP address.

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4.1.2 Router Interconnection Function

NAT Auto-Configuration

When the OfficeServ 7400 functions operating through the IP network such as VoIP signal processing, gateway etc. are operating on the Network Address Translation (NAT) network, it may be necessary to convert between the Private IP address and the Public IP address. The call server and the data server interconnects with each other and share the information on the conversion between the private IP and public IP, which enables the OfficeServ 7200 to provide services smoothly. This function is only available between the OfficeServ 7400's call server and data server.

Time Synchronization

In the OfficeServ 7400, the call server and the data server interconnect to each other and synchronize their time. This function is only available between the OfficeServ 7400's call server and data server.

WAN Interface Failover for VoIP

If the data server's WAN interface gets down, the OfficeServ 7400's call server and data server interconnects to provide a secondary WAN Interface and sends the related information to the call server to maintain the VoIP call service. This function is only available between the OfficeServ 7400's call server and data server.

SIP-ALG

When the OfficeServ 7400 functions operating through the IP network such as VoIP signal processing, gateway etc. are operating on the Network Address Translation (NAT) network, it may be necessary to convert between the Private IP address and the Public IP address. For this purpose, an ALG is processed from the Data server's SIP-ALG in response to the Call Server's SIP call.

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4.1.3 Router ALG Interface

NAT Application Level Gateway (ALG)

When various functions such as the VoIP signal process function and gateway function executed through the IP network in the OfficeServ 7400 are executed in the Network Address Translation (NAT) network, the conversion between the private IP address and public IP address should be performed. In this case, the call server and the data server interface each other and share the information on the conversion between the private IP and public IP, which enables the OfficeServ 7400 to provide services smoothly. This function operates only between the call server and data server of the OfficeServ 7400.

Firewall ALG

When various functions such as the VoIP signal process function and gateway function executed through the IP network in the OfficeServ 7400 are executed in the network that has a firewall, the system should be set to prohibit the firewall from cutting off the packet not manually but automatically for the smooth firewall traversing. This function operates only between the call server and data server of the OfficeServ 7400.

VPN ALG

When various functions such as the VoIP signal process function and gateway function executed through the IP network in the OfficeServ 7400 are executed in the Virtual Private Network (VPN), the system should be set to prevent the packet blocking during the IP address conversion due to the tunneling. In this case, the call server and data server interface each other and share the tunneling conversion information for smooth services. This function operates only between the call server and data server of the OfficeServ 7400.

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4.2 VoIP Function

The VoIP functions represents the voice communication service offered through the IP network. It provides call services based on the phones and standard protocol connected to the IP network. The OfficeServ 7400 supports the SIP and H.323 standard protocol.
Its interconnection with the server enables the VoIP service to more users. To use the SIP/H323 trunk line and the SIP local line functions, a VoIP license is required. A required number of license (equivalent to the number of channels) must bi issued and registered to the system to use the corresponding functions. Refer to the programming manual MMC 841 Configuration for license registration.

4.2.1 VoIP Network

To communicate with another system through the VoIP networking, the MGI64/ MGI16 board must be installed in the OfficeServ 7400.

4.2.2 VoIP Trunk Line Interface

The OfficeServ 7400 provides the VoIP trunk line interface (H.323/SIP). If the local line terminal registered to the OfficeServ 7400 uses the VoIP trunk line, it can use the VoIP communication with other users. The OfficeServ 7400 controls calls and each MGI64/MGI16 board connects the speech path.

User Registration

The OfficeServ 7400 provides a server-based user registration function. To interconnect and use the device with the server, a user must complete its registration in order to access the service. The SIP interface users are identified by the SIP address in the e-mail format. The user registration function saves and manages the current user’s IP address for a given time, and provides the user information according to the authenticated user’s demands.

4.2.3 SIP Phone Interface

The OfficeServ 7400 provides a functionality to use the standard SIP phone in a local line. Once the external standard SIP phone is registered as an OfficeServ 7400 phone, it can use the allocated OfficeServ 7400's phone number to provide call processing services between the SIP phones, between the SIP phone and the digital phone, and between the SIP phone and the PSTN trunk line.

Standard SIP Phone Registration

Register a SIP phone operating as a SIP interface to the OfficeServ 7400, and perform the call processing service following the system's numbering plan.

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Standard SIP Phone Basic Call Processing

Provides local, trunk line call services through the standard SIP phones registered to the OfficeServ 7400. Diverse features offered from the key phone system are generally not provided on the standard SIP phone; therefore, only the basic local, trunk line call services are provided.

Standard SIP Phone Additional Call Processing

The following additional local line services are available from the standard SIP phone registered to the OfficeServ 7400.

- Call Hold/Resume
- Consultation
- Call Transfer
- Call Waiting
- Call Pickup
- Call Forwarding
- Conference
- Call Park
- DND
- Call Back
- Message Waiting Indication

4.2.4 Call Log

This records the related information to the call process performed in the SIP telephone which is saved into a file, transmitted and managed into an external system management package.

4.2.5 Forward Busy

The call server always monitors the SIP telephone status through the SIP server.
If the ‘Forward Busy’ function is set, the incoming call is forwarded to the specified telephone number when a call is forwarded to a busy SIP telephone.

4.2.6 Forward No Answer

If the ‘Forward No Answer’ function is set, the incoming call is forwarded to the specified telephone number when a call is not answered by the SIP phone for a specific time.

4.2.7 Parallel Forking

If multiple SIP telephones are set to be used by one user in the SIP server and the priority of the call connection is the same, all assigned telephones will ring at the same time when the call is forwarded. When the call is answered on one of assigned telephones, the call will be connected and other ringing telephones will be disconnected.

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4.3 Data Server Functions

The OfficeServ 7400 functions as router, switches, performs security function, or serves as data network applications or data access interfaces (WAN, LAN, DMZ). The OfficeServ 7400 functions as router, switches, performs security function, or serves as data network applications or data access interfaces.

4.3.1 Switches

802.1w Rapid Spanning Tree

Rapid Spanning Tree Protocol (RSTP) provides rapid convergence of the spanning tree and provides for fast reconfiguration critical for networks carrying delay-sensitive traffic such as voice and video. The specification for RSTP is IEEE 802.1w-2001. The RSTP specification for provides compatibility with legacy STP based networks.

802.1w Rapid Spanning Tree and PVST+ (Per VLAN STP)

The RSTP (Rapid Spanning Tree Protocol) ensures fast convergence time to the network topology organized by the switch, and provides fast network reconfiguration to the network traffics sensible to delays such as voice or video. The RSTP is defined in the IEEE 802.1w-2001, and ensures compatibility with the actual STP (802.1d) based network.
Supports the PVST+ which provides a Spanning Tree for each VLAN.

802.1p Packet Priority

The switch extracts the priority field from the Ethernet frame configured according to the 802.1p specification standard, and discriminatively processes the frame according to the priority of the specified operation standard.
The packets are categorized into emergent packets and non-emergent packet and are processed.

VLAN (802.1Q)

The Virtual Local Area Network (VLAN) groups the related equipment by the work group according to the LAN operational policy regardless of the location of the user equipment. The VLAN also processes switching for the work groups. The VLAN removes the effects of unnecessary broadcasting packet and configures the stable switching subnet only for the corresponding group by separating and processing the group in the virtual LAN. Accordingly, the switch can provide the differentiated QoS services and the VLAN can be configured based on the switch port and MAC address.
The system automatically configures the VLAN for the IP telephone, signal process gateway, media gateway, and UMS required for services of the OfficeServ 7400, and performs the QoS process. The OfficeServ 7400 provides 32 VLAN groups.

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IGMP Snooping

L2 switch (located in the lower layer of the IP router) without the IGMP (Internet Group Management Protocol) function is located between the IP router and multicast group member (host), intercepts the IGMP message. And then the L2 switch operates in the IP router like the group member and operates in the group member like the IP router, which is referred as the IGMP Snooping.
The IP layer multicast group information included in the IGMP message is reflected in the MAC filtering database, its own switching database. The group information is processed in the MAC multicast address format mapped with the IP multicast address.

802.1x Supported

IEEE 802.1x Standards defines the formats and the operation procedures of EAP over LAN (EAPoL) frame that can send/receive the Extensible Authentication Protocol (EAP) between terminals and Access Point (AP). These standards are called the port security protocol because they can be used in the procedure permitting the network access of the terminal only by acquiring the physical port license of Bridge or wireless AP from the authentication server. This performance of the authentication procedure by ports enables the control of charging policies, usage restriction, or band allocation, etc separately by ports.

Port Trunking Function Supported

Port Trunking means Port Aggregation that collects the physical ports into the logical ones. That is, like the 100 BASE-TX securing 100M bandwidth, the function collects those many ports into the logical port for expanding the bandwidth to be used.

PoE (IEEE 802.3af) Function Supported

Power over Ethernet (PoE) is designed so that no additional power supply to the network equipments used in wireless AP or other wired LAN is necessary. PoE allows the user to send the data and the power simultaneously via one Ethernet cable, which reduces the installation cost in most cases as well as provides the high flexibility in selecting the installation site of the wireless AP and the network equipments.

QoS Function Supported

OfficeServ 7400 provides the function of 802.1p Packet Priority and Level Classification Setup for supporting the Quality of Service (QoS). The 802.1p Packet Priority is the expansion of the standard MAC header in the network packet. This expansion provides the packets with priority by using 3-bit. The packet of the higher priority is treated preferentially and is processed ahead than the packet of the lower priority.
The Level Classification Setup function gives the packets the levels of High/Low and processes them according to their levels, which makes the differential services possible.

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GARP/GVRP Function Supported

Generic Attribute Registration Protocol (GARP)/Generic VLAN Registration Protocol (GVRP) define a GARP application that provides the 802.1Q-compliant VLAN pruning and dynamic VLAN creation on 802.1Q trunk ports. GVRP is an application defined in the IEEE 802.1P standard that allows for the control of 802.1Q VLAN.

4.3.2 Router

Various Network Interface

The OfficeServ 7400 provides the E0, E1, and E2 network interfaces, which are connected to the WAN through Ethernet interface, provides the serial network interface connected through the V.35, HSSI serial interface.

Static Routing

The OfficeServ 7400 configures the fixed routing table between each network interface to process the static routing. In this case, the routing table cannot be dynamically changed by the routing protocol, and specific routing services will be provided according to the pre-set routing policy.

WAN Interface (Ethernet, PPPoE, DHCP Client)

E0, E1, E2 Ethernet WAN Interface enables the connection to internet by using the Static IP, PPPoE, DHCP client protocol.

V.35 Interface (PPP, HDLC, Frame Relay)

The OfficeServ 7400 accesses Internet through the V.35 serial interface in the transfer speed of up to 2Mbps. In this case, the OfficeServ 7400 supports various environments using the functions such as the PPP, HDLC, and Frame Relay Encapsulation.

HSSI Interface (PPP, HDLC, Frame Relay)

Internet can be connected via High Speed Serial Interface (HSSI) with the transmission speed of maximum 52Mbps. Generally, HSSI can use the equipments of token-ring and Ethernet network for connecting to the equipments operating at the speed of Synchronous Optical Network (SONET) OC-1 or T3 circuit.

IPv6 Routing and IPv6 over IPv4 Tunneling

This IPv4/IPv6 Dual Stack supports the IPv4 and IPv6 Routing. The IPv6 over IPv4 Tunneling also provides diverse tunneling methods such as Configured/Automatic Tunneling, 6to4 Tunneling, ISATAP Tunneling and NAPT-PT.

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Routing Protocol

The OfficeServ 7400 supports the routing information-exchanging protocol to react on the network environmental change and to effectively process the routing.

- Routing Information Protocol version1 (RIPv1), RIPv2
  These protocols are widely used for managing the routing information in the middle-size independent network such as a group of LANs.
- Open Shortest Path First version2 (OSPFv2)
  This routing protocol is used prior to the RIP in the large-size independent network. A router detects and reports any change in the routing table or the network to other routers. In this way, all routers share the same routing information.
- BGP4 (Border Gateway Protocol 4)
  As an Exterior Gateway Protocol through which Autonomous System (AS) sends/receives the routing information between other networks, the Version 4 of BGP is currently used. BGP4 uses various matrixes when selecting the optimized path to the destination. BGP4 compares each matrix having priority and selects the optimized path.

Routing Protocol

The OfficeServ 7400 supports the routing information-exchanging protocol to react on the network environmental change and to effectively process the routing.

- RIPv1 (Routing Information Protocol version1), RIPv2, RIPng
  These protocols are widely used for managing the routing information in a middle-sized independent network such as a group of LANs.
- OSPFv2 (Open Shortest Path First version2), OSPFv3
  This routing protocol is used prior to the RIP in a large-sized independent network. A router detects and reports any change in the routing table or the network to other routers. In this way, all routers share the same routing information.
- BGP4 (Border Gateway Protocol 4), BGP4+
  This is the Exterior Gateway Protocol that the AS (Autonomous System) uses to send/receive routing information to/from other networks. The current BGP is use is version 4. The BGP4 uses diverse metrics to select the best path to the destination; each metric will be referenced following the priority order to provide the best path.

GRE Tunnel (Generic Routing Encapsulation)

The GRE Tunneling creates a virtual tunnel to provide a logical, non-physical path. A GRE tunnel over IPSec method, interconnected with the VPN, is used for general purposes. In this case, the original IP header and the payload is encapsulated/encrypted to ensure confidentiality.

VRRP (Virtual Router Redundancy Protocol)

The VRRP is a Hot Standby function securing the end-host's communication path via the identical Ethernet's backup router in case the main router stops functioning properly.

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Multicast Routing

- Internet Group Management Protocol (IGMP)
  Internet Group Management Protocol (IGMP) is a protocol that manages the multicast group operating at one Ethernet segment. It controls the segment so that a user can subscribe or secede as a member of the specific multicast group.
- Distance Vector Multicast Routing Protocol (DVMRP)
  Distance Vector Multicast Routing Protocol (DVMRP) is a protocol for supporting the transmission of the multicast data in a network. This protocol sends the multicast data in a format of unicast packet, and the packets are reassembled into multicast data at the destination. DVMRP can be operated in various formats of networks including Ethernet, and even can be operated via the routers that the multicast is not supported with.
- Protocol Independent Multicast-Sparse Mode (PIM-SM)
  PIM-SM is designed in order to route multicast packets into multicast groups and in order to construct the allocation tree efficiently at WAN, by which is optimized in the environment where the data stream occur in many places.

Routing between VLAN Groups

The communication between the VLAN groups through the routing between the VLAN groups.

HTBQ/Bandwidth on Demand (BoD)

The queuing process is differentially performed according to the level table where the routing process priority for a data server is defined.

RTP Priority

The RTP (Real-Time Transport Protocol) packet is a VoIP media packet. The queuing process for the RTP packet is prior to that for other data pack, which helps to maintain the tone quality. This function is useful when using the VoIP function in the network where the VoIP packet that should be processed in real time and other packets for the general office work are mixed processed.

IP-ToS Process

This function checks the ToS (Type of Service) field of the IP header and processes it according to priority of the corresponding routing in the data server.
This function reproduces the ToS field flowing into the data server, performs the routing process first of all, and heightens the process priority in the next HOP.

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4.3.3 Security

NAT/PT (In/Out/Exclusive/Redirect)

The security function supports the conversion function between the private IP address and public IP address in the network where security is required.
The Inbound, Outbound, Exclusive, and Redirect functions are supported.

- In bound: This function performs the forwarding process for the packet flowing from the WAN to the IP and port of the LAN specified in the NAT/PT conversion table.
- Outbound: This function converts the IP address of the transmitter into the global IP address according to the NAT/PT conversion table for transmitting the packet from the LAN to the WAN.
  - Exclusive: This function is used for the IP address that is not applied by the NAT/PT conversion.
  - Redirect: When the Domain Name Server (DNS) server IP in the data server management sector is changed, each IP terminal uses the pre-DNS IP and the this function changes the DNS IP by registering the post-DNS IP into the Redirect table

Firewall

- Access filtering
  This function prevents the access to disallowed IP address to control the access for the resource non-disclosed to the outside and to control the external resource for which the membership in the LAN may access.
- DMZ function

  This function is used for connecting the web server and mail server, which are firewall-protected LAN networks but need to be freely accessed from the outside, to the subnet separated from the LAN network where the firewall blocking is not applied. In this way, the access from the outside can be more smoothly with the access control service through the firewall.
- Port Forwarding

  This function is almost the same as the DMZ function but is used for connecting to specific network without the separately divided DMZ port. This function is used for the Extra network services as well as the DMZ function. The Extra network is configured for the party out of the office to access Intranet in the office through Internet.
  In this network, the user should take care of security on Intranet.

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Intrusion Detection System (IDS)

This function monitors the packets on the network and detects the packets, which can damage the network operation, making the network more stably operate. The IDS is divided into various types from a detection type where a specific-type attack is detected to the abnormal traffic detecting type, which are based on the Snort Rule (www.snort.org) defining the intrusion pattern and types. The detected packets are sorted and processed into Close connection/port or service disable/Alarm/log based on the intrusion pattern and the level and processed. In the case of the alarm, The system will notify to the system administrator immediately.

Virtual Private Network (VPN)

- VPN function
  The system provides the private network function by using the Internet that is an open network based on the. The OfficeServ 7400 provides the VPN gateway function based on the IPSec (IP Security), which is useful to build the enterprise network with reduced cost and enforced security by using the public network such as Internet rather than the dedicated network.
- VPN Tunnel Mode
  This mode processes the VPN function by configuring the tunnel between the VPN gateway and the gateway in each data server of the OfficeServ 7400. Up to 100 VPN channels are available for one VPN.
- PPTP
  PPTP is a tunneling protocol for using the IP-based network. PPP encapsulates the data by wrapping the data with PPP header. PPTP is a protocol that reconfigures the packets by adding Generic Routing Encapsulation (GRE) header and IP header to this so that the packets can be transmitted via IP inter network.
- L2TP
  L2TP is a protocol that combines PPTP and Layer 2 Forwarding (L2F), which collects the strong points of PPTP and L2F. That is, it encapsulates a user PPP frame, which is a Layer 2 frame, in an additional message called L2TP and then transmits it to the device connected to the public network such as IP, X.25, frame relay, or Asynchronous Transmission Mode (ATM).

4.3.4 Data Server Applications Functions

DHCP

The OfficeServ 7400 can assign the IP address by operating the DHCP. When using the DHCP server in another subnet, the OfficeServ 7400 supports the DCCP relay function. The IP address of the IP equipment connected to the OfficeServ 7400 is can be easily managed.

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SIP Aware ALG (SIP Application Gateway)

This function is used for re-creating packets for the smooth communication by checking the SIP signal process packets according to the NAT/PT table in the data server.
When using the data server of the OfficeServ 7400, the SIP equipment can operate regardless of the packet blocking caused by the firewall or the NAT/PT conversion.

Outside ALG Interface

This function enables the outside application to retrieve or control the information such as the NAT/PT conversion information, firewall blocking information, and the VPN tunnel information processed in the data server. This function supports the control packets, which are used for H.323, VoIP networking, and IP telephone operating in the Call server, to be smoothly serviced without any blocking.

Network Load Balancing (NLB)

Network Load Balancing (NLB) is roughly realized for 2 purposes, i.e. NLB and Failover. The first purpose is the NLB function to extend system bandwidth by automatically distributing the network traffic with outside to external networks if there are more than one external network. The second purpose is the Failover function to make network communication normal via another external network with normal operation even when link fail occurs in some of external network. In other words, network communication is available until the line fail occurs in all external networks.

System Management Interface

This function allows the administrator to report and manage the alarm, event, traffic, and logging information including the IDS information of the data server into the system administrator package through the TCP/UDP. Whether to report can be optionally specified based on the management data type.

Management Function (Web/CLI/SNMP/RMON)

- CLI: This function is used for configuring the data server function by using the CLI (Command Line Interface) on the Telnet.
- Web: The user can configure and view the operation of the data server functional block by using the web browser.
- SNMP: SNMP agent collects and stores the device information according to the specification (MIB) installed and determined at each network devices. The SNMP manager existing at the place separated from the agent manages the overall network by collecting the information on SNMP gent distributed at the network.
- Remote Monitoring (RMON): The traffic of the network can be checked and analyzed via 4RMON groups (history, statistics, alarms, events).

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4.5 System Management Function

The OfficeServ 7400 provides the call server configuration management and information display, and can view the system's actual status (alarm status etc.) from the Installation Tool package.

4.5.1 System Management Function

Composition Management

The system can view the following configuration information of the OfficeServ 7400 installed on the site.

- OfficeServ 7400 Unit Composition
- OfficeServ 7400 Version Information
- Data function setting/version information

Package Update

The system can update the OfficeServ 7400's software package.

4.6 NMS Management Function

The OfficeServ NMS is a Network Management System (NMS) providing the OfficeServ system's operation and maintenance function. According to the ITU-T M.3010standard, the OfficeServ NMS provides the following function to effectively operate the OfficeServ system.

- General Management
- Configuration Management
- Telephony Management
- VoIP Management
- Switch Management
- Router Management
- Fault Management
- Performance Management
- Security Management

The OfficeServ NMS is operated using a Client-Server method. The server directly connects to the OfficeServ system, provides the interface between the client and the OfficeServ system, and manages diverse databases. The client provides the operator's interface.

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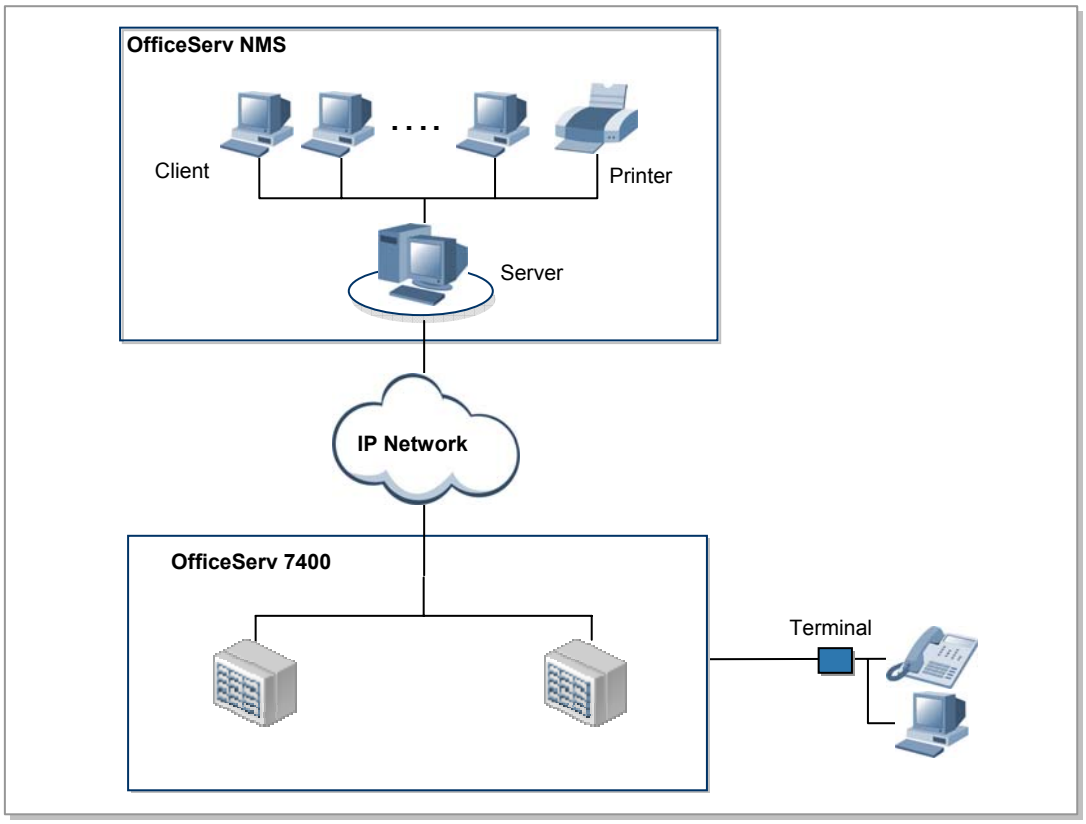
The interconnection between the OfficeServ NMS and the OfficeServ system is as follows.



Additionally, the OfficeServ NMS has the following advantages.

Real-Time System Status Monitoring

The OfficeServ NMS uses the SNMP to collect the system errors in real-time.

User Friendly GUI Design

The OfficeServ NMS is developed using standard graphic interfaces. All commands are organized in graphic menus, so the operator can easily understand and use the OfficeServ NMS functions.

Various Statistics Reports

The OfficeServ NMS provides a textual, graph format and statistics of the data such as errors, performances, traffics etc. to the operator. The operator can view the data from a file format or print to the printer.

Object-oriented Approach

The OfficeServ NMS is designed using an object-oriented method. Different subsystems are divided into objects, so the required functionalities can be easily added and/or upgraded.

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Error Handling

If the OfficeServ NMS fails to execute the command entered by the operator, a corresponding error message will be displayed prior to executing the next task. The operator can view the error message prior to executing incorrect commands, thus providing accurate and efficient system managements.

Flexible Platform

The OfficeServ NMS can be installed and operated from diverse platforms such as general-purpose PCs or workstations. Therefore, the operator can select an appropriate OfficeServ platform respective to the network size and/or its management scope.

Help

The OfficeServ NMS provides a help function organized by hypertexts. The help function provides a detailed document to understand the OfficeServ NMS and a brief, clear usage of the OfficeServ NMS menus.

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ABBREVIATION

A

AA	Auto Attendant
AC	Alternating Current
ALG	Application Level Gateway
AME	Answering Machine Emulation
AOM	Add On Module
AP	Access Point
AS	Autonomous System
ASIC	Application Specific Integrated Circuit
AWG	American Wire Gauge

B

BRI	Basic Rate Interface
BoD	Bandwidth on Demand

C

CBQ	Class Based Queuing
CDR	Call Detail Record
CID	Caller Identification
CLI	Command Line Interface
CODEC	Coder/Decoder
CRC	Cyclic Redundancy Code
CSMA/CD	Carrier Sense Multiple Access/Collision Detect
CTI	Computer Telephony Integration

D

DASL	Digital Adaptor for Subscriber Loop
DC	Direct Current
DHCP	Dynamic Host Configuration Protocol
DID	Direct Inward Dialing
DLI	Digital Line Interface
DMZ	DeMilitarized Zone

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DNS	Domain Name Server
DPIM	Door Phone Interface Module
DSL	Digital Subscriber Line
DSP	Digital Signal Processor
DTMF	Dial Tone Multi Frequency
DVMRP	Distance Vector Multicast Routing Protocol

E

EAP	Extensible Authentication Protocol
EMI	Electro-Magnetic Interference

F

FE	Fast Ethernet
FXS	Foreign Exchange Station
FXO	Foreign Exchange Office

G

GPLIMT	Gigabit PoE LAN Interface Module TX
GK	GateKeeper
GND	Ground
GSIM	Gigabit Switch Interface Module
GSIMT	Gigabit Switch Interface Module TX
GWIMT	Gigabit WAN Interface Module TX

H

HDB3	High Density Bipolar of order 3
HDLC	High-level Data Link Control
HSSI	High Speed Serial Interface

I

IDS	Intrusion Detection System
IGMP	Internet Group Management Protocol
IMAP4	Internet Message Access Protocol version 4
IP	Internet Protocol
IPC	Inter Processor Communication
ISDN	Integrated Services Digital Network
IPSec	Internet Protocol Security
ITU	International Telecommunication Union

K

KDB	Keyset Daughter Board

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L

L2TP	Layer 2 Tunneling Protocol
LAN	Local Area Network
LCD	Liquid Crystal Display
LP40	Local Control Processor 40
LCR	Least Cost Routing
LED	Light Emitting Diode
LIM	LAN Interface Module

M

MP40	Main Control Processor 40
MIS	Miscellaneous
MMC	Man Machine Communication (Code, Command)
MPD	Metering Pulse Detection

N

NAT	Network Address Translation

O

OSPF	Open Shortest Path First
OSM	OfficeServ Manager

P

PC	Personal Computer
PCM	Pulse Code Modulation
PFT	Power Fail Transfer
PIM-SM	Protocol Independent Multicast-Sparse Mode
PLIM	PoE LAN Interface Module
PoE	Power over Ethernet
POP3	Post Office Protocol 3
PPP	Point to Point Protocol
PPPoE	PPP over Ethernet
PPS	Pulse Per Second
PPTP	Point to Point Tunneling Protocol
PRI	Primary Rate Interface
PRS	Polarity Reverse Signal
PSTN	Public Switched Telephone Network
PSU	Power Supply Unit

Q

QAM	Quadrature Amplitude Modulation
QoS	Quality of Service

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R

RF	Radio Frequency
RCM	R2 Caller identification Module
RMON	Remote Monitoring
RTP	Real-time Transmission Protocol
RTPT	Real-time Transmission Protocol Transfer
RTPR	Real-time Transmission Protocol Receiver

S

SIP	Session Initiation Protocol
SLI	Single Line Interface
SMDR	Station Message Detail Recording
SME	Small Medium Enterprise
STP	Signaling Transfer Point
SMTP	Simple Mail Transfer Protocol
SONET	Synchronous Optical Network

T

TAPI	Telephony Application Programming Interface
TEPRI	T1 E1 Primary Rate Interface
ToS	Type of Service
TRK	Trunk
TTS	Text-To Speech

U

UA	User Agent
UART	Universal Asynchronous Receiver and Transmitter
UDP	User Datagram Protocol
UMS	Unified Messaging Service
USB	Universal Serial Bus
UTP	Unshielded Twisted Pair

V

VDSL	Very high bit rate Digital Subscriber Line
VLAN	Virtual Local Area Network
VMS	Voice Mailing System
VoIP	Voice over Internet Protocol
VPM	Voice Processing Module
VPN	Virtual Private Network

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W

WAN	Wide Area Network
WBS	Wireless Base Station
WIP	Wireless IP Phone
WLAN	Wireless Local Area Network
WLI	Wireless LAN Interface

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OfficeServ 7400

System Description

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